Practice Quiz Solutions

Chapter 1

1. Operations management deals with
   a. making the stuff
   b. selling the stuff
   c. raising capital
   d. the creation and delivery of goods and/or services
   e. Both a and d.

See the definition in Section 1: Operations management deals with the creation and delivery of goods and/or services, or "making the stuff."

2. A supply chain
   a. is two or more parties linked by a flow of resources
   b. is frequently global in scope
   c. only applies to products that are sold to the end consumer
   d. Both a and b
   e. Both a and c

See definition in Section 1: A supply chain is two or more parties linked by a flow of resources—typically material, information, and money—and frequently global in scope

3. Supply chain management
   a. is not related to logistics management
   b. involves the management of activities surrounding the flow of raw materials to the finished product or service enjoyed by end customers, and back, in the case of recycling or returns
   c. as a defined area of responsibility has only existed since the mid-1900's
   d. is separate (i.e., no overlap) from the functional areas of finance, marketing, and operations
   e. Both b and c

See definition in Section 1: SCM involves the management of activities surrounding the flow of raw materials to the finished product or service enjoyed by end customers, and back, in the case of recycling or returns.

4. The term supply chain management
   a. was coined by consultants at Booz-Allen & Hamilton in the 1980's
   b. was introduced to draw attention to the changing role of the logistics manager
   c. was introduced to draw attention to the need for a perspective that recognizes the strategic importance of logistics and an integrated system-wide outlook when improving logistics processes
   d. Both b and c
   e. All of the above.

See Section 1: The term supply chain management first appeared in a 1982 *Financial Times* article about an approach being developed by Keith Oliver and other consultants at Booz-Allen

& Hamilton. A few years later Houlihan, also with Booz-Allen & Hamilton, wrote an article in the *International Journal of Physical Distribution & Inventory Management* that elaborated on SCM. The article draws attention to the changing role of the logistics manager, and the need for a perspective that recognizes the strategic importance of logistics and an integrated system-wide outlook when improving logistics processes.

5. To say SCM is important because of dollars means that
  a. it is expensive to change how supply chains are managed
  b. SCM focuses on the movement of money in international trade
  c. a lot of money is spent on SCM activities
  d. the cost of capital is higher for well developed supply chains
  e. Both a and d

See Section 2: The value of inventory averages around 14% of gross domestic product (GDP) and the annual transportation and warehousing expense averages around 9% of GDP in the U.S. (Wilson 2005). Year 2004 U.S. GDP, for example, was almost $12 trillion, which puts the dollar value of U.S. inventory in nearly the same league as the U.S. federal budget. A June 1999 Benchmarking Partners report finds that supply chain management expenses (e.g., inventory holding, transportation, order management, supply chain financing, related information technology) average 25% of U.S. corporate budgets.

Chapter 2

1. ERP systems
   a. have existed since the early 1900's
   b. are used to plan, control, and record the day-to-day transactions of running a business
   c. provide real-time access to information in a consistent manner throughout the organization
   d. are relatively easy to implement
   e. Both b and c

See Section 1: Enterprise resource planning (ERP) systems are used to plan, control, and record the day-to-day transactions of running a business and to provide real-time access to information in a consistent manner throughout the organization.

2. SCA systems
   a. are frequently linked to ERP systems
   b. stands for supply chain aggregation systems
   c. are divided into four categories of software
   d. focus on transaction processing such as order entry and billing
   e. Both a and d

See Section 2: SCA systems, which are frequently linked to ERP systems, support the detailed planning and control of material, money, and information flow through supply chains. These systems help managers analyze and interpret massive amounts of ever changing data.

3. SRM software
   a. is a category of ERP software
   b. stands for supply and resource management software
   c. is used to help analyze and manage the buy side of the business
   d. Both a and b
   e. Both b and c

See Section 2: Supplier relationship management software, which is one of three main categories of SCA software, helps analyze and manage the buy side of the business.

4. CRM software
   a. is a category of ERP software
   b. stands for customer relationship management software
   c. is used to help analyze and manage the sell side of the business
   d. Both a and b
   e. Both b and c

See Section 2: Customer relationship management software, which is one of three main categories of SCA software, helps analyze and manage the sell side of the business.

5. A digital representation of an enterprise
   a. refers to the database containing available resources and prescriptions that describe how resources are used to create products and services
   b. is an element of an ERP system
   c. contains information on past, present, and projections into the future
   d. plays an important role in e-commerce
   e. All of the above

See Section 3: The ERP database is a digital representation of an organization (see Figure 2.2) with information on past, present, and future availability of resources and prescriptions. It plays a pivotal role in e-commerce at a deep level (i.e., buying and selling over the Internet via dynamic coordination across a supply chain through information and collaboration).

Chapter 3

1. System slack
  a. is not necessary in supply chains and should be eliminated
  b. is a consequence of factors that are outside of management's control
  c. is idle, underutilized, or non-value adding resources
  d. does not exist in most supply chains
  e. Both a and d

See Section 1: System slack is idle, underutilized, or non-value adding resources. System slack is almost always essential for providing good customer service and value in supply chains.

2. Quantity uncertainty
  a. stems from six sources
  b. includes output uncertainty, which refers to the timing and number of outputs from a process
  c. is illustrated by a buyer who orders 100 units and receives 100 units
  d. is one cause of system slack
  e. Both b and d

See Section 1.1: Quantity uncertainty is one cause of system slack, and stems from three sources: input, output, and demand.

3. Time lags
  a. contribute to system slack because of conflicting objectives across departments or firms
  b. contribute to system slack because of Little's law
  c. contribute to system slack because of the trumpet of doom
  d. Both b and c
  e. All of the above

See sections 1.2 and 1.5: Little's law and the trumpet of doom are two principles of nature that explain why time lags contribute to system slack. Conflicting objectives across departments or firms is another cause of system slack.

4. TQM
  a. stands for timeliness and quality of management
  b. is an organization-wide effort directed towards the continuous improvement of quality
  c. relies on information technology
  d. was introduced in the early 1900's
  e. Both b and c

See Section 2.2: TQM is an organization-wide effort directed towards the continuous improvement of quality.

5. JIT
  a. was initially developed and implemented at Toyota
  b. has evolved over time and has been adapted in a wide range of sectors
  c. is commonly known in industry today as lean
  d. Both b and c
  e. All of the above

See Section 2.3: The principle and practices of JIT were initiated and largely developed at the Toyota Motor Company over a period of more than 20 years. JIT concepts have been extended and adapted to a wide range of sectors and the approach has come to be more commonly known in industry as simply lean.

Chapter 4

1. Order processing
a. is important because it is an area of high customer contact
b. is generally unaffected by advances in information technology
c. is unrelated to order fulfillment
d. is unrelated to demand management
e. Both c and d

See Section 1: Order processing, which is also known as order fulfillment and is part of demand management, is important because of the impact on customer perceptions and because it can depend so heavily on information technology.

2. An early warning mechanism
a. is used to speed up the order processing function
b. does not require commitment from customers
c. is illustrated by a discount that is offered to customers who place advance orders
d. is unrelated to influencing demand
e. Both b and c

See Section 4.1: Early warning mechanisms encourage some (or more) customers to provide early commitment of their future demand. This is a tactic that influences demand in a way that improves predictability.

3. The law of large numbers
a. explains why the tactic of part standardization can add value
b. explains why the tactic of postponement of form or place and add value
c. explains why the tactic of time lag reduction can add value
d. Both a and b
e. All off the above

See Section 4.2: Part standardization and postponement increase the volume of the product or service to be forecasted, thus reducing relative variability as predicted by the law of large numbers.

4. What is the forecast for the next period according the 4-period moving method given that shipments during the last 7 periods from oldest to most recent were 215, 301, 214, 380, 292, 409, 268?
a. 268.0
b. 277.5
c. 297.0
d. 301.8
e. 337.3

See Section 6: $F_t = ma_t = (380 + 292 + 409 + 268)/4 \approx 33.7.3$

5. What is the forecast for the next period according the basic exponential moving method given that demand in the period that just ended was 268, the most recent smoothed estimate of the mean is 305.5, and the smoothing parameter is $\alpha = 0.3$?

a. 268.0
b. 279.3
c. 294.3
d. 301.8
e. 305.5

See Section 6: $F_t = s_t = 305.5 + 0.3(268 - 305.5) \approx 294.3$

Chapter 5

1. XML
   a. is designed to replace HTML
   b. is relevant for computer to computer communication over the Internet
   c. is a language that tells your computer how to display information on your computer screen
   d. Both b and c
   e. All of the above

See Section 2.1: XML and HTML perform different functions. XML is used for defining languages that tell your "XML browser" what the information means whereas HTML tells your computer how to display information on your computer screen.

2. A reverse auction
   a. has multiple potential sellers and one buyer
   b. can be conducted over the Internet
   c. is more likely to benefit the buyer when there are many potential sellers
   d. related to a principle of nature called the winner's curse
   e. All of the above.

See Section 2.6: Characteristics conducive to reverse auctions (from the buyer's perspective) include a high cost item, many potential suppliers, and a standardized product or service. From the winner's curse, it also follows that another characteristic is a product or service with an obscure cost structure.

3. A contract
   a. with a fixed price is more complicated and difficult to administer than the alternative of a cost plus fixed fee contract
   b. with a fixed price has more risk (from the buyer's perspective) due to cost uncertainty than the alternative of a cost plus fixed fee contract
   c. without a buyback clause has more risk (from the buyer's perspective) due to demand uncertainty than the alternative with a buyback clause
   d. with a fixed price incentive clause shares the risk due to demand uncertainty between buyer and seller
   e. Both c and d

See sections 4.3.2 and 4.2.3: A buyback contract shifts some of the demand uncertainty risk from buyer to seller. A cost plus fixed fee contract requires that costs be verified. A fixed price contract has less risk due to cost uncertainty than the cost plus fixed fee, and a fixed price incentive contracts shares cost uncertainty risk between buyer and seller.

4. The Robinson-Patman Act
  a. requires that retailers charge the consumer the same price for the same product
  b. helps protect retail stores with less purchasing power from price discrimination
  c. regulates the use of reverse auctions
  d. Both b and c
  e. All of the above

See Section 4.3.4: The Robinson-Patman Act is sometimes referred to as the anti-chain-store act because it protects smaller stores from having to pay higher prices for the same product than the large retail chains.

5. BATNA
  a. stands for best attainment through novel applications
  b. is a tactic designed to reduce the chance of unpleasant surprises discovered after a contract has been signed
  c. is a tactic that can help save the buyer from making undue concessions to reach a settlement
  d. is why some companies have policies that restrict buyers from accepting gifts from sellers
  e. Both b and c

See Section 4.4.2: Developing a best alternative to a negotiated agreement (BATNA) prior to negotiating helps save the buyer from making undue concessions to reach a settlement (i.e., by knowing the worst that can happen if negotiations fail).

Chapter 6

1. A form of inventory is
  a. cycle stock, which is inventory undergoing transformation in either place or form
  b. speculative stock, which is inventory to protect against uncertainty
  c. safety stock, which is excess inventory acquired prior to an anticipated price increase
  d. All of the above
  e. None of the above

See Section 1: Cycle stock is excess inventory due to order batching. Speculative stock is excess inventory acquired prior to an anticipated price increase. Safety stock is inventory to protect against uncertainty.

2. A cost of holding inventory is
  a. capital costs, such as the cost to finance the inventory investment
  b. inventory risk costs, such as the cost damaged product
  c. inventory service cost, such as insurance
  d. All of the above
  e. None of the above

See Section 1: The statements regarding different inventory holding cost categories with examples come directly from the Section.

3. If the demand rate is 105,000 units per year and 15,000 units are ordered at a time, then the number of orders placed per year is
  a. less than once
  b. 1.7
  c. 7.0
  d. 7.4
  e. 52.1

See Section 2 or Section 3.1: 15,000 goes into 105,000 7 times, so there are 7 orders per year.

4. Suppose that the demand rate is 12,000 units per year, the transaction cost associated with placing an order is $100, the annual holding cost rate is 25% of product value, and each unit costs $50. If 12 orders are placed per year, then the average annual transaction cost plus cycle stock holding cost is
  a. $621
  b. $1,200
  c. $1,325
  d. $6,350
  e. $7,450

See Section 3.1: 12 orders per year means that the order quantity Q = 12,000/12 = 1,000 units. $TC(1000) = 12000/1000 \times 100 = \$1{,}200$. $HC(1000) = (1000/2)\times 0.25 \times 50 = \$6{,}250$. $TC(1000) + HC(1000) = \$7{,}450$.

5. Suppose that the demand rate is 12,000 units per year, the transaction cost associated with placing an order is $100, the annual holding cost rate is 25% of product value, each unit costs $50, and the shortage cost rate is 8 times larger than the holding cost rate. The optimal number of units on backorder when a replenishment shipment arrives is

a. 0
b. 52
c. 111
d. 413
e. 465

See Section 3.2: $D = 12000$/year, $c_t = 100$, $c_e = 0.25 \times 50 = 12.5$, $c_s = 8 \times c_e = 100$. $Q^* = [2 \times 100 \times 12000/12.5]^{1/2} \times [(12.5 + 100)/100]^{1/2} \approx 465$. $b^* = Q^* \times 12.5/(12.5 + 100) \approx 52$

Chapter 7

1. The single period model
   a. is relevant when demand is deterministic
   b. captures the trade-off between the cost of ordering too much and the cost of ordering too little
   c. is a generalization of the economic order quantity model from Chapter 6
   d. sets the optimal service level as the ratio of short cost rate to the sum of shortage and excess cost rates
   e. Both b and d

See Section 2: The SPM is based on a fundamental problem type characterized by the statements in answers b and d. It is distinct from the EOQ model and there is uncertainty (i.e., demand is not deterministic).

2. Marginal analysis
   a. can be used to determine the formula for the optimal service level for the single period model
   b. in the context of the single period model compares the increase in expected excess cost with the decrease in expected shortage cost when the order quantity is increased
   c. can be used to determine the formula for the optimal service level for a base stock policy
   d. Both a and b
   e. All of the above

See Table 7.1: Marginal analysis is used to determine the optimal *Q* and the formula for the optimal service level, and the same formula applies for determining base stock.

3. A base stock policy
   a. is reasonable when the fixed cost of placing an order is high and demand occurs frequently
   b. answers the questions of when and how much to order by ordering the demand amount whenever demand occurs
   c. results in a base stock level that is continually changing
   d. is designed to protect against uncertainty in demand during the selling season
   e. All of the above

See Section 3.1: Base stock is defined as on-hand inventory plus on-order. It remains constant because the answers to when and how much are *whenever demand occurs* and the *demand amount*. Thus, it doesn't make economic sense unless the fixed cost of placing an order is very low relative to other system costs, or demand occurs infrequently. The base stock level protects against uncertainty in demand over the replenishment leadtime.

4. Fill rate
  a. is the same as service level
  b. is a measure of profitability
  c. is the probability that there will be no backorders during the replenishment leadtime
  d. can be increased by increasing inventory, but each percentage point increase requires an increasing incremental investment in inventory
  e. Both a and c

See Section 3.2 and Figure 7.6: Fill rate is the proportion of demand shipped on time whereas service level is the probability of satisfying all demand on time during some time interval.

5. Suppose that for a (Q, R) policy with $Q = 200$ and $R = 50$, the average number of units backordered when a replenishment shipment arrives is 9.7. This means that the fill rate is
  a. 4.9%
  b. 9.7%
  c. 80.6%
  d. 90.3%
  e. 95.2%

See Section 3.2: Given that b = average number of units backordered when a replenishment order arrives, $FR \approx 1 - b/Q = 1 - 9.7/200 \approx 95.2\%$

Chapter 8

1. Deterministic capacity analysis
  a. is one of six basic options for assessing capacity requirements
  b. assumes that the demand rate is constant
  c. assumes that the service rate is uncertain
  d. predicts that 4 servers are needed when service time is 4 minutes and customers arrive at a rate of 40 per hour
  e. is more accurate than queueing models and computer simulation

See Section 1.1: Deterministic capacity analysis assumes deterministic arrivals (i.e., constant demand) and deterministic service times. The analysis can be done very quickly and easily, but because it ignores uncertainty, it is less accurate than the other two options: queueing models and computer simulation. It works by comparing the demand rate to the service rate, i.e., 40 arrivals per hour versus a service rate of 15 per server-hour (= 60 minutes/hour ÷ 4 minutes/service) means that 3 servers can serve 45 customers per hour, which covers the demand rate of 40 per hour.

2. The *M*/*M*/1 model
  a. assumes deterministic service times
  b. assumes exponential inter-arrival times
  c. assumes a multiple servers
  d. has formulas that illustrate the curse of utilization
  e. Both b and d

See Section 1.2: *M*/*M*/1 assumes exponential inter-arrival times and service times, and one server. Among other formulas from the model, the curse of utilization is illustrated by $L_s = \rho/(1-\rho)$, i.e., as utilization (ρ) approaches 100%, the average number in the system (L_s) approaches infinity.

3. Suppose there are two servers, the average service time is two minutes, and average arrival rate is 40 per hour. The system utilization is
  a. 5%
  b.10%
  c. 67%
  d. 75%
  e. 80%

See Section 1.2: λ = 40/hour, μ = 60 minutes/hour ÷ 2 minutes/service = 30/hour, m = 2 servers, and $\rho = \lambda/(m\mu) = 40/60 \approx 67\%$

4. Other things being equal, if variance
  a. in service time is reduced, then average waiting time increases
  b. in inter-arrival time is increased, then average waiting time increases
  c. in service time is reduced, then system utilization decreases
  d. Both b and c
  e. Both a and c

See Section 1.2: This question is related to the curse of variance – as variance increases, congestion increases. Changes in variance do not affect utilization, which depends only on average arrival and service rates.

5. The graph of individual utility from Prospect theory
  a. shows individuals to be more sensitive to gains than losses
  b. illustrates the principle of nature: law of large numbers
  c. illustrates the principle of nature: Khintchine limit theorem
  d. illustrates the principle of nature: satisfaction = perception - expectation
  e. Both a and d.

See Section 2 and Figure 8.7: The Prospect theory graph highlights that whether one perceives a loss or a gain depends on the reference point (e.g., what he or she expected). The other statements are not true.

Chapter 9

1. Regarding the four basic types of production systems,
   a. ETO stands for engineer-to-order
   b. MTO means that product is produced in response to a specific customer order from purchased components
   c. MTS is popular for high volume standardized product with relatively stable
   d. ATO occupies the middle ground between the extremes of MTS and MTO
   e. All of the above

See Section 1 and Table 9.1: The statements are based on information in Table 9.1.

2. A pull approach to answer the questions of when and how much to produce
   a. is an apt characterization of the kanban system
   b. is proactive—projected inventory (or equivalently, projected demand) combined with projected leadtimes are used to signal when to order or make product
   c. is simpler than a push production system
   d. is an apt characterization of the POLCA system
   e. Both a and c

See sections 2.1 and 2.3: A pull approach, like the kanban system, is reactive, which makes it simpler to use than the proactive push approach. POLCA combines pull and push.

3. MRP
   a. includes as one of its inputs, the master production schedule
   b. stands for material requirements planning
   c. includes as one of its inputs, the bill of material
   d. Both a and c
   e. All of the above

See Section 2.2: Material requirements planning uses three main input files – master production schedule, bill of material, and item master.

4. POLCA
   a. stands for production with on-line cells and automation
   b. is suitable for products with stable demand
   c. uses cards to pull work through the cells
   d. cards are the same as kanban cards
   e. cards signal that material is needed

See Section 2.3: POLCA stands for paired-cell overlapping loops of cards with authorization. It is most suitable for products with highly variable demand (e.g., MTO and ETO environments). POLCA cards are different from kanban cards, and are used to signal that capacity is available.

5. The sequencing rule
   a. WSPT is used when fairness is a chief concern
   b. SPT works by ordering jobs from smallest-to-largest processing time
   c. LS can be used to quickly determine whether there exists a sequence where everything can be completed on time
   d. EDD maximizes the fill rate
   e. All of the above

See Section 3.1: WSPT is an efficiency oriented rule. SPT stands for shortest processing time and works the way described in answer b. Replacing ‘LS’ with ‘EDD’ in c makes the statement correct. Replacing ‘EDD’ with ‘MA’ in d makes the statement correct.

Chapter 10

1. Regarding transportation modes,
a. LTL stands for less-than-truckload
b. rail is a good option when short leadtimes are important
c. a main advantage of air relative to cargo ship for international freight is low cost
d. Both a and b
e. All of the above

See Section 1.1: Rail leadtimes are generally long and not very predictable. Air is very expensive compared to other modes.

2. The class of a product
a. plays a major role in the pricing of truckload shipments
b. is determined by such factors as density, value, stowability and handling, and susceptibility to damage
c. that is the maximum value (i.e., class 500) is the least expensive class to ship
d. is not relevant when negotiating freight prices
e. Both a and b

See Section 1.2: Freight class of a product is relevant when negotiating LTL prices (i.e., plays little to no role in truckload pricing). The higher the freight class, the higher the LTL freight cost.

3. Regarding other services and service providers,
a. transportation brokers specialize in consolidating small shipments from various shippers into a large shipment
b. freight forwarders coordinate and manage the transportation requirements for a shipper through such services as carrier selection, rate negotiation, document preparation, shipment tracing, and bill processing
c. diversion refers to changing the consignee, sometimes after the shipment has reached its original destination
d. detention and demurrage costs are incurred when *free time* is exceeded
e. All of the above

See Section 1.3. By interchanging ‘transportation brokers’ and ‘freight forwarders’ in a and b, the answers become correct. By replacing ‘reconsignment’ with ‘diversion’ in c, makes the statement correct (diversion refers to hanging the destination of a shipment while enroute)

4. Stop-offs
a. mean that a shipment is loaded and/or unloaded at various points between origin and destination
b. is always offered as an option by carriers
c. are used in *milk runs*
d. are more likely to save money when stop-offs occur closer to the origin than the final destination
e. Both a and c

See sections 1.3 and 2.2: Stop-off privileges are not always offered, and are more likely to save money when the stop-offs occur closer to the final destination than the origin.

5. The number of warehouses in a distribution network
a. is influenced by a trade-off between economies of scale in warehouse operation and transportation costs
b. should increase as outbound transportation cost rates increase
c. should increase as demand increases
d. Both a and c
e. All of the above

See Section 3.2.1: The trade-off and impact of changing cost and demand rates brought out in the GOMA model.

Chapter 11

1. Control charts
  a. are designed to separate good parts from bad parts
  b. draw on probability theory, and more specifically, hypothesis testing
  c. take advantage of the fact that humans are good at detecting patterns in images
  d. are plots of process capability indices
  e. Both b and c

See Section 2: Control charts are used to improve processes, and are plots of sample statistics. They draw on two basic ideas that are given in b and c.

2. An $\overline{X}$ -chart
  a. is a plot of sample variances
  b. is used to detect changes in the process that affect the process mean
  c. with a sample statistic that lies outside the control limits is an indicator that the process is in-control
  d. is used for attribute data
  e. Both a and d

See Section 2: An $\overline{X}$ -chart is used for variable data. It is a plot of sample means, and is designed to detect changes that affect the process mean. A sample statistic outside of the control limits is an indicator that the process is not in control and should be stopped to identify underlying causes.

3. The range of the sample—120.1, 124.7, 115.9, 114.0, 111.7, 122.2—is
  a. 0
  b. 5.0
  c. 13.0
  d. 118.1
  e. 124.7

See Section 2: The range is the difference between the largest and smallest values in the sample, i.e., 124.7 – 111.7 = 13.0.

4. Regarding measures of process capability,
  a. if process capability index with a value larger than 1 indicates that the process is capable of producing within specifications more than 99.7% of the time
  b. the C_{pk} process capability index is more meaningful when the process mean is not centered within the specifications
  c. C_p and C_{pk} are measures for how effectively the outputs of a process satisfy market requirements
  d. Both a and c
  e. All of the above

See Section 2.2: Process capability indices are ratios that relate the gap between the upper and lower specification limits to the standard deviation of the process output. The statements given in a through c are true.

5. Six sigma
  a. is relevant for the service sector and the manufacturing sector
  b. is not related to TQM
  c. is a quality improvement initiative that instills an attitude and expertise for reducing variability and waste and increasing consistency in outputs
  d. Both a and c
  e. Both a and b

See Section 2: Six sigma is a quality improvement initiative pioneered by Motorola in the 1980's, and has since been implemented in service and manufacturing settings. It draws heavily on the principles and tenets of TQM. It emphasizes variability and waste and waste reduction via a focus on processes and inputs.

Chapter 12

1. The process – product matrix
   a. classifies processes according degree of cleanliness
   b. classifies products according to cost
   c. is a framework for detecting misalignment between the business strategy and the supply chain metrics/processes
   d. Both b and c
   e. All of the above

See Section 1.1: The process – product matrix classifies processes according to the nature of material flow, and classifies products according to degree of standardization.

2. The supply chain – product matrix
   a. classifies products according to predictability of demand
   b. classifies the supply chain according to industry
   c. indicates that a responsive supply chain should be matched with functional products
   d. indicates that an efficient supply chain should be matched with innovative products
   e. Both a and d

See Section 1.2: Supply chains are classified according the performance – either responsive or efficient. Interchanging 'responsive' with 'efficient' in c and d makes the statements correct.

3. Regarding the characteristics of a responsive supply chain,
   a. the primary purpose is to respond quickly to unpredictable demand in order to minimize stockouts, forced markdowns, and obsolete inventory
   b. excess buffer capacity is maintained rather than striving for high utilization
   c. suppliers are selected primarily for speed, flexibility, and quality rather than cost and quality
   d. products are designed to be modular rather than to maximize performance and minimize cost
   e. All of the above

See Section 1.2 and Table 12.1: The statements can be found in Table 12.1.

4. SCOR
   a. stands for supply chain order and replenishment
   b. is part of the supply chain – product matrix
   c. specifies a framework for describing supply chain processes with associated terminology, metrics, and best practices
   d. Both a and b
   e. Both a and c

See Section 2: SCOR stands for supply chain operations reference. It is not part of the supply chain – product matrix.

5. Regarding causes of system slack and principles of nature,
  a. the longer the time lags, the greater the uncertainty due to the trumpet of doom.
  b. quantity uncertainty contributes to long flowtimes and congestion due to the curse of variability
  c. cross-training reduces quantity uncertainty, and consequently flowtimes and congestion, due to the law of large numbers
  d. time lags contribute to the bullwhip effect in supply chains
  e. All of the above

See Section 3: Two causes of system slack are (1) quantity uncertainty—input, output, and demand and (2) time lags. The above linkages among these causes and principles of nature are summarized in the Section.