

Question 1

The Krewe of Orpheus

The Krewe of Orpheus maintains a supply of swizzle sticks for events throughout the year. Demand for swizzle sticks is shockingly low, a quick check of krewe records from last year reveals that they used only 585,000, but the krewe president believes that they should be good stewards of what they have, so they seek to manage this inventory using the EOQ policy, although they prefer to refer to it as an EOKrewe policy for obvious reasons.

Swizzle sticks are not expensive items, they cost a nickel apiece largely due to the club logo printed on each one. This also serves to increase the lead time as they can't be obtained from a standard restaurant supply house. Instead, they must be ordered with an eye towards the six-day lead time. It costs \$15 to place an order, most of this cost is a result of explaining the meaning of "Laissez les bons temps rouler" and why it should be printed on the edge of each swizzle stick. Holding cost is 20% of purchase price.

A retired operations management professor moves to New Orleans, joins the Krewe of Orpheus and convinces krewe leadership to buy their own swizzle stick production equipment. They invest in a medium-scale machine called the Swizzo 2025, which is capable of producing swizzle sticks at the rate of 1800 per day. What will be their annual holding cost if they produce the optimal batch size?

- 58.63
- 62.20
- 65.77
- 69.34

Answer: <https://biology-forums.com/index.php?topic=1894712>

Question 2

The slope of the line labeled "B" in the diagram is:

- rate of inventory demand.
- production rate.
- shipping rate.
- production rate minus rate of inventory demand.

Answer: <https://biology-forums.com/index.php?topic=1894714>

Question 3

The injection molding department of Alver Inc. uses an average of 40 pounds of a special powder per day. The plant operates 250 days per year. The daily usage of the powder is normally distributed with a standard deviation of 5 pounds per day. The lead time to obtain the powder from a supplier is 9 days. The annual holding cost is \$2 per unit and the cost of ordering the powder is \$50.

How many orders will be placed each year?

Answer: <https://biology-forums.com/index.php?topic=1894740>

Question 4

A manager is trying to improve a single-server queueing system through automation. The average service time is 20 minutes per customer, exponentially distributed, and the arrival rate is 16 customers per 8-hour day (Poisson arrivals). The automated system will have a constant service time of 16 minutes. The effect of this change will:

- decrease utilization.
- increase waiting time.
- decrease waiting time.
- have no effect since the service time is unchanged.

Answer: <https://biology-forums.com/index.php?topic=1895013>

Question 5

For the following transition matrices, determine the transient or absorbing states.

1.00000.4.6000.3.7000.80.20

Answer: <https://biology-forums.com/index.php?topic=1895083>

Question 6

The following data summarizes the historical demand for a product:

MonthActual DemandMarch20April25May40June35July30August45

Use a four-period moving average to determine the forecasted demand for July, August, and September.

Answer: <https://biology-forums.com/index.php?topic=1894885>

Question 7

The equation $8xy = 32$ satisfies the proportionality property of linear programming.

- true
- false

Answer: <https://biology-forums.com/index.php?topic=1894123>

Question 8

Table 3.7: The Love Boat

Captain Stubing of The Pacific Princess seeks to maximize the return for their scheduled 14 day tour of Europe and has a number of options available to him. He can ply his guests with alcohol, upsell them on fancier restaurant fare or include more expensive excursion options. These alternatives are not without tradeoffs, since different guests prefer different options, depending largely on their age and wherewithal. Among the limitations Captain Stubing must consider is the number of excursions; they must offer at least five alternatives per day for each the ten days they will reach port. In addition, the restaurant choices must exceed 12 major styles of cuisine and the bar themes down in The Grotto should rotate every other day for the 14 days. It's possible to rotate them twice a day, but any more than that and poor Isaac spends more time tearing down and setting up than he does mixing libations. Ideally, there should be at least one different bar theme for every cuisine type. The total budget for excursions, restaurants and bar has been set by the parent company at \$150,000. It costs \$1,500 to stock supplies for a major cuisine category, it costs \$5,000 to include each different excursion, and it costs \$900 to set up with a different bar theme. Based on historical data, Captain Stubing believes that each new bar setup will generate \$1,500 profit, each new cuisine type will bring in \$5,000, and each excursion type will generate \$17,000 for the ship.

Based on the variable cells sensitivity report, what conclusion is best?

Cell

NameFinal

ValueReduced

CostObjective

CoefficientAllowable

IncreaseAllowable

DecreaseB\$2Bar120150015601E+30C\$2Cuisine120500016601E+30D\$2Excursion24.240170001E+303458.33333

- The value of Excursion can be infinite, since $1E + 30$ is 10 to the 30th power.
- The values of Bar, Cuisine, and Excursion are all equal to zero.
- The values of Bar and Cuisine can be negative since they have allowable decreases of $1E + 30$.
- The optimal value for the objective function is \$490,080

Answer: <https://biology-forums.com/index.php?topic=1894200>

Question 9

Comedy Pasture

A horse and two llamas are discussing the key areas of their domain on a lazy summer afternoon. The llamas favor the pond and shade and like to browse the fruit trees and oaks on the property, making their way to the barn only when their owner favors them with some oats. The horse prefers to graze the grass and hay for food and drink from the pond but will race up to the barn when the owner is handing out oats up there. Between the three of them, they have stepped off the distances between many of these key points several times and believe that they have developed an accurate map, shown below. As incredible as it may seem, neither the horse nor the llamas have had any training in management science, which is where you come in.

Which of these routes for the horse is actually the shortest between the pair of nodes?

- Fruit - Hay = 160'
- Barn - Pond = 200'
- Grass - Pond = 190'
- Fruit - Shade = 165'

Answer: <https://biology-forums.com/index.php?topic=1894387>

Question 10

The Cruise

Their cruise would port out of New Orleans and promised seven days with a panoply of excursions in Jamaica, Cozumel, and Grand Cayman. A list of excursions at each site and key features of each appear in the table. The excursions were all day affairs, so it was possible to engage in only one per port. The cruise ship sailed at night and docked at each of these three ports at the crack of dawn. By dinner time, the ship was on its way to the next port and next set of excursions. The couple was energetic and active for a pair of 52-year-olds, and while enjoying an upper middle class lifestyle, they didn't want to spend money on excursions that might be better spent on tacky souvenirs. The couple therefore budgeted \$250 for the excursions – the prices shown are per couple, so for example, the \$60 will pay for both of them to fill up on jerk chicken and mannish water.

For each of the duplicate excursions (e.g., snorkeling is offered in all three ports), the couple researched the quality of the activity and ranked the excursion among the available alternatives, with higher numbers indicating better quality. Thus, snorkeling in Jamaica is better than in Cozumel, and snorkeling in Cozumel is better than in Grand Cayman. For the unique experiences, i.e., the turtle farm, the default rating was the a 3.

SiteRatingActivityCostJamaica3snorkeling\$100Jamaica1party island\$95Jamaica2horseback ride\$120Jamaica3local cuisine\$60Cozumel2snorkeling\$110Cozumel3party island\$55Cozumel1horseback ride\$70Cozumel2local cuisine\$90Cozumel3tequila tasting\$130Grand Cayman1snorkeling\$90Grand Cayman2party island\$60Grand Cayman3horseback ride\$110Grand Cayman1local cuisine\$130Grand Cayman3turtle farm\$95(Note - data used in this test question should not be construed as vacation advice.)

The first day on the cruise was a "day at sea" meaning no port of call, and only the amenities onboard for amusement. Restless and uncomfortably full after seven trips through the buffet, the management scientist gambled away most of his vacation money at the onboard casino. The excursions would be a necessity, but now it became less important to maximize the joy of the excursions and more vital to get off the boat as cheaply as possible while still staying busy at the three ports of call. What is an appropriate objective function for this modified cruise vacation?

Answer: <https://biology-forums.com/index.php?topic=1894321>

Question 11

Table 3.10: The Love Boat

Captain Stubing of The Pacific Princess seeks to maximize the return for their scheduled 14 day tour of Europe and has a number of options available to him. He can ply his guests with alcohol, upsell them on fancier restaurant fare or include more expensive excursion options. These alternatives are not without tradeoffs, since different guests prefer different options, depending largely on their age and wherewithal. Among the limitations Captain Stubing must consider is the number of excursions; they must offer at least five alternatives per day for each the ten days they will reach port. In addition, the restaurant choices must exceed 12 major styles of cuisine and the bar themes down in The Grotto should rotate every other day for the 14 days. It's possible to rotate them twice a day, but any more than that and poor Isaac spends more time tearing down and setting up than he does mixing libations. Ideally, there should be at least one different bar theme for every cuisine type. The total budget for excursions, restaurants and bar has been set by the parent company at \$150,000. It costs \$1,500 to stock supplies for a major cuisine category, it costs \$5,000 to include each different excursion, and it costs \$900 to set up with a different bar theme. Based on historical data, Captain Stubing believes that each new bar setup will generate \$1,500 profit, each new cuisine type will bring in \$5,000, and each excursion type will generate \$17,000 for the ship.

What are the appropriate objective function and constraints for this scenario?

Answer: <https://biology-forums.com/index.php?topic=1894208>

Question 12

Under the normal curve, the area between $z = 1.5$ and $z = -1.5$ includes approximately _____ of the values.

- 94%
- 91%
- 87%
- 83%

Answer: <https://biology-forums.com/index.php?topic=1894540>

Question 13

Jolt - M

The soda machines outside the lecture hall sees a steady stream of customers throughout the day. Between the student's use of the machine and the mechanism, it takes 15 seconds (exponentially distributed) to deliver a can of carbonated sugar water to a thirsty customer. Over the course of a twelve-hour lecture day, students arrive at the rate of 450 per hour.

The soda machines have become self-aware and when they are not in use dispensing ice-cold beverages, they are busy formulating a plan for world domination. About how much time over the course of a week can they develop their battle plans?

- 84 hours
- 89 hours
- 94 hours
- 99 hours

Answer: <https://biology-forums.com/index.php?topic=1895032>

Question 14

A(n) _____ represents a limitation to achieving maximum profits due to limited resources.

Answer: <https://biology-forums.com/index.php?topic=1894081>

Question 15

In the Monte Carlo process, values for a random variable are generated by _____ a probability distribution.

- sampling from
- running
- integrating
- implementing

Answer: <https://biology-forums.com/index.php?topic=1894932>

Question 16

In order to model a "prohibited route" in a transportation or transshipment problem, the cost assigned to the route should be _____.

Answer: <https://biology-forums.com/index.php?topic=1894335>

Question 17

Billy Hill's Still

William J Hill runs a small batch artisanal bourbon distillery at a secluded location in the hills of Kentucky. He makes two products, known among his customers as Rotgut and White Lightning. The recipes for the two have been passed down in the Hill family for generations and are Rotgut: 1 bushel of corn, 3 pounds of sugar, 2 hours of cooking time. For the premium blend, White Lightning, he needs 2 bushels of corn, 2 pounds of sugar, and 3 hours of cooking time. Both recipes make enough to fill two jugs, which sell for \$8 apiece for Rotgut and \$12 apiece for White Lightning.

A quick inventory one crisp autumn morning reveals that William has on hand 40 bushels of corn, 70 pounds of sugar, and 50 jugs. He would like to brew up a few artisanal batches, but has recently received a tip that certain agencies have taken an interest in his talents and may be paying him a visit in three days, hence he plans to restrict any brewing activity to 72 hours at most, before he retreats to his home away from home, Lubbock. William cleans his equipment, lights a fire, and ponders the objectives. Obviously the first priority is restricting himself to 72 hours of work – any more than that and he runs the risk of an extended holiday. His second priority to make enough to acquire materials for the next production run and fund his daughter's college tuition - he believes that \$500 would make this production run worth his while. His third and fourth priorities are not to have too much perishable inventory, so he wants to make sure he doesn't have too many bushels of corn on hand (third priority) nor does he want too many pounds of sugar on hand (fourth priority).

William ran the original model in Excel and discovered that he was walking away from significant income. He reformulated the model with a new profit constraint of $16R + 24W + d2+ + d2- = 550$.

All of the other constraints and priorities remained the same. Based on this snippet of the answer report, what happens during this production run?

Variable Cells

\$D\$16Hours d1+00Contin\$E\$16Hours d1-07Contin\$D\$17Profit d2+030Contin\$E\$17Profit d2-00Contin\$D\$18Corn d3+00Contin\$E\$18Corn d3-00Contin\$D\$19Sugar d4+00Contin\$E\$19Sugar d4-010Contin

Answer: <https://biology-forums.com/index.php?topic=1894473>

Question 18

The project manager is negotiating a contract that will provide a substantial bonus if they can complete the project within an agreed deadline. What deadline would give them a 75% chance of finishing the project?

- 26.78 days
- 27.86 days
- 28.67 days
- 26.87 days

Answer: <https://biology-forums.com/index.php?topic=1894424>

Question 19

In a noninstantaneous receipt model, daily demand is 55 units and daily production is 120 units, $Co = \$70$ and $Cc = \$4$ per unit/year. The production facility operates 300 days per year. What is the optimal order quantity?

Answer: <https://biology-forums.com/index.php?topic=1894748>