

141 Sample Questions

1. How many three digit numbers between 000 and 599 have a 4 in them?
2. The following gives the number of sales of a particular item beginning in 1980.

Number of Years since 1980 (x)	0	5	8	12	15	17
Number of Sales (in thousands) (y)	5	7	11	17.3	20	24.5

- (a) Determine the equation of the least-squares line for this data. Round to four decimal places.
 - (b) Use the model you just found to estimate the year in which 15,700 items were first sold.
3. Box A has 2 blue and 3 green marbles. Box B has 4 green and 6 red marbles. You choose a marble from Box A. If it is blue you put it into Box B. You then choose a marble from Box B.
 - (a) Draw a tree diagram representing this situation. Label the branches of the tree with the appropriate probabilities.
 - (b) Find the probability that you choose a green marble from Box A, if you choose a red marble from Box B.
4. Given the following, solve for $a, b, c,$ and d .

$$3 \begin{bmatrix} 1 & 3 \\ -1 & 0 \end{bmatrix}^{-1} \begin{bmatrix} 2 & -4 \\ a & 5 \end{bmatrix} - \begin{bmatrix} 6 & b \\ c & 7 \end{bmatrix} = \begin{bmatrix} 9 & -8 \\ 0 & d \end{bmatrix}^T$$

5. Equation A: $3p + 2x - 6 = 0$ Equation B: $2p - 4x - 2 = 0$
 - (a) If the given equations are the supply and demand functions for a market, which equation is which?
 - (b) Find the equilibrium point for the market and explain its meaning.
6. You choose a letter at random from the words TEXAS AGGIES.
 - (a) Write a uniform sample space for this experiment.
 - (b) Write a non-uniform sample space for this experiment.
 - (c) Find the number of events associated with each of the above sample spaces.
7. You choose 4 cards at random from a standard 52-card deck. What is the probability that you choose at least two hearts?

8. Link has \$17,300 to invest. He decides to invest in three different companies. The QX company costs \$130 per share and pays dividends of \$1.50 per share each year. The RY company costs \$75 per share and pay dividends of \$1.00 per share each year. The KZ company costs \$90 per share and pays \$2.00 per share per year in dividends. Link wants to have twice as much money in the RY company as in the KZ company. Link also wants to earn \$251 in dividends per year. How much should Link invest in each company to meet his goals?
9. Matrix F below shows the number of stuffed animals sold at a local shop during a month. The daddy animals sell for \$7.00, the mommies for \$6.00 and the babies for \$4.00. Find a matrix G such that the product of matrix G and matrix F will show the revenue, R, for selling each kind of animal.

$$F = \begin{matrix} & \begin{matrix} \text{Daddy} & \text{Mommy} & \text{Baby} \end{matrix} \\ \begin{matrix} \text{Horse} \\ \text{Dog} \\ \text{Cat} \end{matrix} & \begin{bmatrix} 2000 & 500 & 1250 \\ 1000 & 3000 & 500 \\ 1500 & 900 & 2000 \end{bmatrix} \end{matrix}$$

10. Shade the region $(A \cap B) \cup C^C$ on a Venn diagram.
11. A sample of movie theater seats is examined and the number of pieces of gum under each seat is counted. The table below shows the results of this experiment:

Number of Seats	11	10	9	8	7	6	5	4
Number of Pieces of Gum	1	2	3	4	5	6	7	8

Find the following: Mean, Median, Mode and Standard Deviation

12. A high school has 2400 students. There is a 3% chance that a student will get a case of the cooties during a semester. What is the expected number of cases of cooties during a semester? What is the standard deviation in the number of cases of cooties during a semester? Use the normal curve approximation to the binomial distribution to find the probability that between 80 and 100 students will get the cooties during a semester.
13. The weight of a medium apple can be closely approximated by the normal distribution with a mean of 200 grams and standard deviation of 12 grams. What is the weight of an apple in the 80th percentile? In a group of 50,000 apples, how many will weigh less than 180 grams? What weights bracket the middle 50% of the population?
14. After a spending spree with your new credit card, you find you owe \$2500. You cut up the card and start paying the account off. You make the minimum payment of \$50 per month. The annual interest rate is 21% compounded monthly on the remaining balance. How long until the account is paid off?

15. The Floral Factory makes three kinds of corsages: Junior, Deluxe and Grande. Each Junior corsage uses 1 flower, 2 accessories and 10 minutes of labor. Each Deluxe corsage uses 2 flowers, 3 accessories and 15 minutes of labor. Each Grande corsage uses 4 flowers, 6 accessories and 20 minutes of labor. The shop has 40 flowers and 80 accessories in inventory and 6 hours of labor available. If a Junior corsage sells for \$5, a Deluxe for \$8 and a Grande for \$12, how many of each type of corsage should be made to maximize the revenue for the Floral Factory? Set up this problem, but do not solve it.

16. An economy consists of communication (C) and utilities (U). The production of 1 unit of communication requires 0.1 units of communication and 0.2 units of utilities, while the production of 1 unit of utilities requires 0.3 units of utilities and 0.4 units of communication. Find the units consumed in the internal production process to meet an outside demand of 187 units of communication and 143 units of utilities.

17. There are three cable companies in a small community: A, B, and C. Currently company A has 5000 customers, B has 4000 customers, and C has 6000 customers. All customers have one-year contracts that run from January to December. Of A's customers, 25% would again choose A, 40% would choose B, and the rest would choose C for the following year of cable service. Of B's customers, 30% would again choose B, 35% would choose A, and the rest would choose C for the following year of cable service. Of C's customers, 45% would again choose C, 25% would choose A, and the rest would choose B for the following year of cable service.
 - (a) How many customers are with each cable company at the beginning of the second year?
 - (b) Find a matrix, that represents the system of equations, that when put into reduced row echelon form will yield the long-term distribution of the cable customers.