King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 105
Exam 1
223
July 18, 2023
Net Time Allowed: 120 Minutes

USE THIS AS A TEMPLATE

Write your questions, once you are satisfied upload this file.

1. A company manufactures hair dryers. The manufacturing cost is \$9 per unit with a fixed cost of \$16,000. A hair dryer sells for \$15. If the company wants to earn a profit of \$50,000, how many dryers must be sold?

   (a) 11,000
   (b) 10,000
   (c) 9,000
   (d) 8,000
   (e) 12,000

2. A commuter airplane has 81 seats. On the average, 90% of those who book for a flight show up for it. How many seats should the airline book for a flight if it wants to fill the plane?

   (a) 90
   (b) 99
   (c) 85
   (d) 88
   (e) 91

3. Suppose consumers will purchase q units of a product at a price of $\frac{200}{q} + 5$ dollars per unit. What is the minimum number of units that must be sold in order that sales revenue be greater than \$9000?

   (a) 1761
   (b) 1671
   (c) 1541
   (d) 1551
   (e) 1471

4. A student receives grades of 63, 75, 66 in three midterms (out of 100 points). The final exam is worth 200 points. The student needs at least 70% to get a grade of C in the course. How many points, at least, must the student obtain in the final (out of 200 points) to get a grade of C?

   (a) 146
   (b) 145
   (c) 139
   (d) 140
   (e) 150

5. If the slope of the line passing through the points $(5, -3)$ and $(2, k)$ is $-\frac{2}{3}$. Then $k = \ldots$

(a) -1
(b) 1
(c) -2
(d) 2
(e) 0

6. A line with slope 8 and x-intercept $= 5$ has a y- intercept $= \ldots$

(a) -40
(b) -50
(c) 40
(d) 50
(e) 45

7. The equation of the line that passing through $(2, -8)$ and parallel to $x = -4$ is

   (a) $x = 2$
   (b) $x = -8$
   (c) $x = -4$
   (d) $x = 4$
   (e) $x = 8$

8. Suppose a manufacturer of shoes will place on the market 50 (thousand pairs) when the price is 35 (dollars per pair) and 35 when the price is 30. Find the supply equation, assuming that price p and quantity q are linearly related.

   (a) $p = \frac{1}{3}q + \frac{55}{3}$
   (b) $p = \frac{-1}{3}q + \frac{55}{3}$
   (c) $p = \frac{1}{3}q - \frac{55}{3}$
   (d) $p = 3q + 55$
   (e) $p = 3q + \frac{55}{3}$

9. Suppose the cost to produce 10 units of a product is \$40 and the cost of 20 unit is \$70. If cost, c, is linearly related to output, q. Find the cost to produce 35 units.

(a) 115
(b) 95
(c) 105
(d) 85
(e) 125

10. If the function $y = f(x) = x^2 - 6x + k$ has a minimum value equals -4. Then $k = \ldots$

(a) 5
(b) -5
(c) 7
(d) -7
(e) 1

11. The demand function for a manufacturer's product is $p = f(q) = 200 - 5q$, where p is the price (in dollars) per unit when q units are demanded (per day). Then the level of production that maximizes the manufacturer's total revenue is

    (a) 20
    (b) 200
    (c) 40
    (d) 60
    (e) 300

12. A gardener has two fertilizers that contain different concentrations of nitrogen. One is 6% nitrogen and the other is 11% nitrogen. He wants to mix them to obtain 20 pounds of a 9% concentration. The number of pounds of 11% nitrogen concentration is

    (a) 12
    (b) 15
    (c) 16
    (d) 4
    (e) 7

13. If one of the solution of the system $\begin{cases} x = \dfrac{4}{y} \\ 3x = 2y + 2 \end{cases}$ is (a, b). Then $a + b = \ldots$

(a) $\dfrac{-13}{3}$
(b) -4
(c) 0
(d) $-\dfrac{4}{3}$
(e) $-\dfrac{14}{3}$

14. Let supply: $p = 2q + 20$, Demand: $p = 200 - 2q^2$, where q the number of units and p is the price. If the equilibrium point is (a, b). Then $a + b = \ldots$

(a) 47
(b) 42
(c) 49
(d) 51
(e) 50

15. By the reduction method, the system $\begin{cases} x+3y+2z-1=0 \\ x+y+5z-10=0 \end{cases}$ has

(a) a solution with one parameter
(b) only one solution
(c) no solution
(d) a solution with two parameters
(e) a solution with three parameters

16. By using matrix reduction, the system $\begin{cases} 3x-4y=0 \\ x+5y=0 \\ 4x-y=0 \end{cases}$ reduces to

(a) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 0 \end{bmatrix}$ and has the trivial solution only
(b) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 0 \end{bmatrix}$ and has infinitely many solutions
(c) $\begin{bmatrix} 1 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}$ and has the trivial solution only
(d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 0 \end{bmatrix}$ and has no solution
(e) $\begin{bmatrix} 1 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}$ and has infinitely many solutions

17. The region indicated in the diagram is described by

(a) $\begin{cases} y \leq 2x \\ x + y > 1 \end{cases}$

(b) $\begin{cases} y \geq 2x \\ x + y > 1 \end{cases}$

(c) $\begin{cases} y \leq 2x \\ x + y \geq 1 \end{cases}$

(d) $\begin{cases} y < 2x \\ x + y > 1 \end{cases}$

(e) $\begin{cases} y \leq 2x \\ x + y \leq 1 \end{cases}$

18. Consider the problem:
Maximize

$$Z = 4x + y$$

subject to

$$\begin{aligned} -x + y &\leq 2 \\ 3x + y &\leq 18 \\ x, y &\geq 0. \end{aligned}$$

If the answer is $Z = a$ when $x = b$ and $y = c$, then $a + b + c = \ldots$

(a) 30

(b) 32

(c) 28

(d) 4

(e) 0