Math 131 - 03 (A)

Midterm Exam # 1

Name:______________________________ Serial #_______________

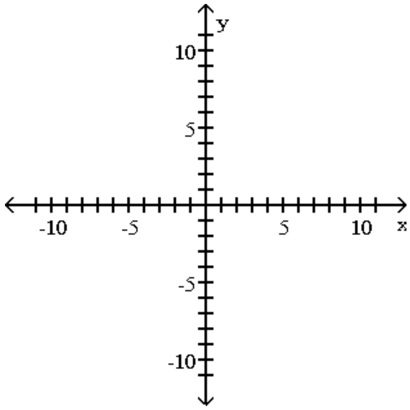
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

1) An economics instructor told his class that the demand equation for a certain product is $p = 500 - q^2$ and its supply equation is $p = 35q + 300$. If the $500 - q^2$ is set equal to the $35q + 300$, then the positive solution to the resulting equation gives the "equilibrium quantity." The instructor asked his class to find this quantity. What answer should the class give?

2) A company produces a product at a cost of $4 per unit. If fixed costs are $10,000 and each unit sells at $8, (a) at least how many units must be sold in order to earn a profit; (b) how many units must be sold in order to earn a profit of $15,000?

3) A student receives grades of 61, 77, 65 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 (out of 200 points) to get a grade of C?

4) For the straight line $4x + 3y - 1 = 0$ find: (a) the slope; (b) the y-intercept; and (c) sketch the graph.



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

5) Which of the following statements are true?

I. Slope is defined for a vertical line.

II. A line that rise from left to right has a negative slope.

III. A line with slope $\frac{1}{4}$ is more nearly horizontal than a line with slope $\frac{3}{5}$.

A) I only

B) II only

C) III only

D) I and III only

E) all of the above

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

6) Find the equation of a line which is perpendicular to the line $3x + 2y - 5 = 0$ and passes through the point $(-3,2)$.

7) Suppose that a manufacturer will place 1000 units of a product on the market when the price is \$10 per unit, and 1200 units when the price is \$11 per unit. Find the supply equation for the product assuming the price p and quantity q are linearly related.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

8) Suppose $f(1) = 5$ and $f(-1) = 2$. Find $f(x)$ if f is a linear function.

A) $f(x) = -3x + 5$

B) $f(x) = \frac{x}{3} - \frac{16}{3}$

C) $f(x) = -\frac{x}{3} + \frac{14}{3}$

D) $f(x) = -3x - 2$

E) $f(x) = \frac{x}{3} + \frac{2}{3}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

9) For the parabola $y = f(x) = 4 - 2x - 3x^2$, find: (a) the vertex, (b) the y-intercept, and (c) the x-intercepts.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

10) The demand function for a manufacturer's product is $p = f(q) = 600 - 3q$, where p is the price (in dollars) per unit when q units are demanded (per week). Find the level of production that maximizes the manufacturer's total revenue and value of mazimum revenue.

A) 125 B) 100 C) 175 D) 150 E) 200

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

11)

Solve the following system algebraically: $\begin{cases} \frac{1}{2}x - \frac{1}{2}y = \frac{1}{3} \\ \frac{1}{3}x + \frac{1}{2}y = \frac{5}{3} \end{cases}$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

12) A manufacturer sells his product at \$23 per unit, selling all he produces. His fixed cost is \$18,000 and his variable cost per unit is \$18.50. The level of production at which the manufacturer breaks even is

A) 3000 units. B) 3500 units. C) 4000 units. D) 4500 units. E) 5000 units.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

13)

Using the method of reduction, solve the system: $\begin{cases} 2x - y - 4z = 0 \\ 4x + y - 2z = 0 \\ x - y - 3z = 0 \end{cases}$

14) Solve the system: $\begin{cases} 3y = \sqrt{x - 2} \\ x - 2 = 4 \end{cases}$

15) Maximize

$$Z = 4x + y$$

subject to

$$-x + y \le 2$$
$$3x + y \le 18$$
$$x, y \ge 0.$$

16) Use the corner-point technique to maximize

$$Z = x + 2y$$

subject to

$$y \ge x + 3$$
$$x + 2y \le 24$$
$$x, y \ge 0.$$

Also determine the values of x and y at which the maximum value occurs.