MAT 112A   Fall 2018   Print Name: _____

Departmental Final Exam - Version B   EKU ID: _____

                                                 Instructor: _____

Calculators are NOT allowed on this part of the final. Show work to support each answer. Full credit may not be awarded for questions without any work shown.   Each question in this section is worth 10 points.

Write the slope-intercept form of the equation for the line passing through the given pair of points.

    1) (3, -8) and (0, -3)

    2) Solve: $-13 \le \dfrac{-2 - 3x}{2} \le -7$

Solve the system of equations, if a solution exists.

3) $\begin{cases} -6x + 5y = -34 \\ -2x + 2y = -10 \end{cases}$

4) Solve: $x^3 - 5x^2 + 6x = 0$

MULTIPLE CHOICE. Choose the best answer. Circle the correct letter on the answer sheet, and then fill in your circle. Each question in this section is worth 5 points. Calculators are allowed on this section of the exam.MULTIPLE CHOICE. Choose the best answer. Circle the correct letter on the answer sheet, and then fill in your circle. Each question in this section is worth 5 points. Calculators are allowed on this section of the exam.
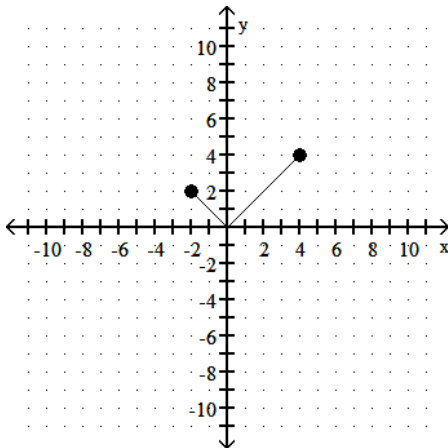
1) For the function y = f(x) described by the table, find f(1).

X	Y₁	
-2.00	1.00	
-1.00	-1.00	
0.00	-3.00	
1.00	-5.00	
2.00	-7.00	

X= -2

A) 0   B) -5   C) -2   D) Not shown

2) Find the domain and range for the function graphed below.

F) Domain: [2, 4]; Range: [0, 4]   G) Domain: (-2, 4); Range: (0, 4)
H) Domain: [-2, 4]; Range: [0, 4]   J) Domain: [0, 4]; Range: [-2, 4]

3) It costs $43 per hour plus a flat fee of $28 for a plumber to make a house call. What is an equation of the form y = mx + b for this situation?
A) y = 28x + 43   B) y = 43x   C) y = 43x + 28   D) y = 28x

4) The mathematical model C = 800x + 80,000 represents the cost in dollars a company has in manufacturing x items during a month. How many items were produced if costs reached $400,000?
F) 600 items   G) 399,200 items   H) 400 items   J) 300 items

5) The demand for a certain product is given by p + 7q = 371, and the supply is given by p - 5q = 23, where p is the price in dollars and q is the quantity demanded or supplied at price p. Find the price at which the quantity demanded equals the quantity supplied.
    A) $171   B) $165   C) $168   D) $170

6) The cost of a rental car for the weekend is given by the function C(x) = 148 + 0.29x, where x is the number of miles driven. Find the slope of the graph of this function and interpret it as a rate of change.
    F) 148; The cost of the rental car increases by $148 for each mile driven.
    G) 148; The cost of the rental car decreases by $0.29 for each mile driven.
    H) 0.29; The cost of the rental car increases by $0.29 for each mile driven.
    J) 0.29; The cost of the rental car decreases by $0.29 for each mile driven.

7) Use the data shown in the scatter plot to determine whether the data should be modeled by a linear function.

    A) No, the data points do not lie close to a line
    B) Yes, the data are exactly linear
    C) Yes, the data are approximately linear

8) The function $P(d) = 1 + \dfrac{d}{33}$ gives the pressure, in atmospheres (atm), at a depth d feet in the sea. Find and interpret P(59). Do not round your answer.

    F) $\dfrac{92}{33}$; At a depth of $\dfrac{92}{33}$ feet, the pressure is 59 atm.

    G) $\dfrac{92}{33}$; At a depth of 59 feet, the pressure is $\dfrac{92}{33}$ atm.

    H) $\dfrac{59}{33}$; At a depth of $\dfrac{59}{33}$ feet, the pressure is 59 atm.

    J) $\dfrac{59}{33}$; At a depth of 59 feet, the pressure is $\dfrac{59}{33}$ atm.

Solve the equation.

9) $p^2 + 5p - 5 = 0$

    A) $\dfrac{-5 - 3\sqrt{5}}{2}$
    B) $\dfrac{5 + 3\sqrt{5}}{2}$
    C) $-5 \pm 3\sqrt{5}$
    D) $\dfrac{-5 \pm 3\sqrt{5}}{2}$

Find the exact solutions to the quadratic equation in the complex numbers.

10) $(x - 17)^2 = -64$

    F) $17 \pm 8i$
    G) $-17 \pm 8i$
    H) $17 \pm 16i$
    J) $8i \pm 17$

Provide an appropriate response.

11) Determine whether a linear or quadratic function would be a more appropriate model for the graphed data. If linear, tell whether the slope should be positive or negative. If quadratic, decide whether the coefficient of x^2 should be positive or negative.

DENTAL FLOSS USE

People
(in Millions)

Years since 2000
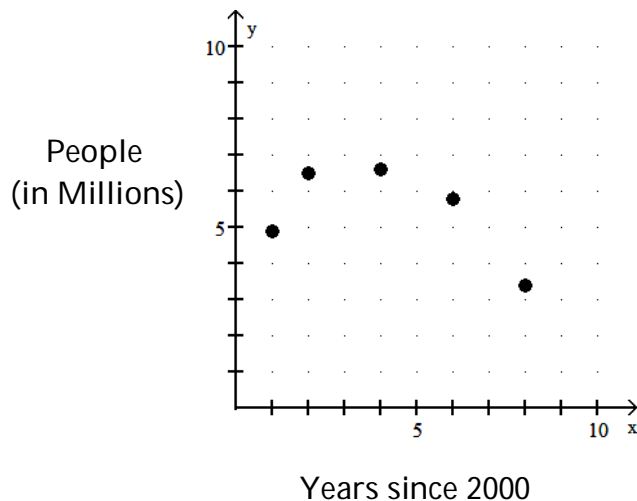
    A) Quadratic; positive
                              B) Linear; positive
    C) Linear; negative
                              D) Quadratic; negative

Find the function value.

12) For $f(x) = |x + 6|$, find $f(-14)$.

    F) -8
    G) 2
    H) 8
    J) -2

13) Find the requested value.

$$f(-3) \text{ for } f(x) = \begin{cases} x^2 + 4x - 2, & \text{if } x \leq -3 \\ x, & \text{if } x > -3 \end{cases}$$

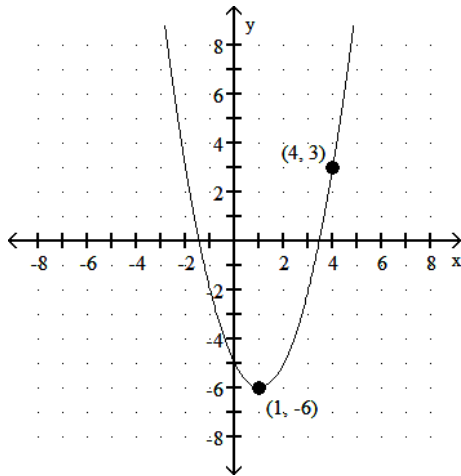   A) -5   B) 23   C) -3   D) -1

Provide an appropriate response.

14) Write the equation of the quadratic function whose graph is shown.

    F) $y = (x - 1)^2 - 6$ G) $y = -(x - 1)^2 - 6$

    H) $y = -(x - 1)^2 + 6$ J) $y = (x + 1)^2 - 6$

15) The intensity of a radio signal from the radio station varies inversely as the square of the distance from the station. Suppose the the intensity is 8000 units at a distance of 2 miles. What will the intensity be at a distance of 3 miles? Round your answer to the nearest unit.

    A) 3520 units   B) 3582 units   C) 3556 units   D) 3539 units

Solve the problem.

16) Bob owns a watch repair shop. He has found that the cost of operating his shop is given by $c(x) = 4x^2 - 344x + 77$, where x is the number of watches repaired. How many watches must he repair to have the lowest cost?

    F) 77 watches   G) 43 watches   H) 38 watches   J) 40 watches

Solve the equation.

17) $\sqrt{x + 7} + 5 = x$

    A) x = 2   B) x = 9, 18   C) x = 9   D) x = 2, 9

18) Solve: $|8x + 3| < 1$

F) $x < 8$

G) $x < -\dfrac{1}{2}$ or $x > -\dfrac{1}{4}$

H) $x < -\dfrac{1}{2}$

J) $-\dfrac{1}{2} < x < -\dfrac{1}{4}$

19) Solve: $(2x - 9)(x + 3)(x - 5) = 0$
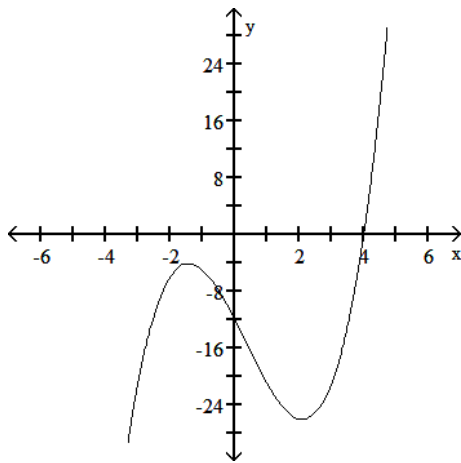
A) 9, -3, 5

B) 135

C) $\dfrac{9}{2}$, -3, 5

D) $-\dfrac{9}{2}$, 3, -5

Determine whether the polynomial function is cubic or quartic.

20)

F) Quartic

G) Cubic

Solve the problem.

21) The table below gives the violent crime rate (per 100,000 people) for a particular state every five years from 1970 to 2010.

Year	Violent Crime Rate
1970	4.8
1975	5.0
1980	5.9
1985	7.3
1990	8.9
1995	10.4
2000	11.6
2005	12.3
2010	12.1

Use technology to find the cubic function that is the best fit for this data, where x is the number of years after 1970. Round to five decimal places.

A) $y = -0.00034x^3 + 0.01950x^2 - 0.04893x + 4.79798$

B) $y = -0.00053x^3 + 0.02460x^2 - 0.01893x + 5.79798$

C) $y = -0.00024x^3 + 0.02250x^2 - 0.03111x + 4.68687$

D) $y = 4.79798x^3 - 0.04893x^2 + 0.01950x - 0.00034$

Use the given graph of the polynomial function to state whether the leading coefficient is positive or negative and whether the polynomial function is cubic or quartic.

22)
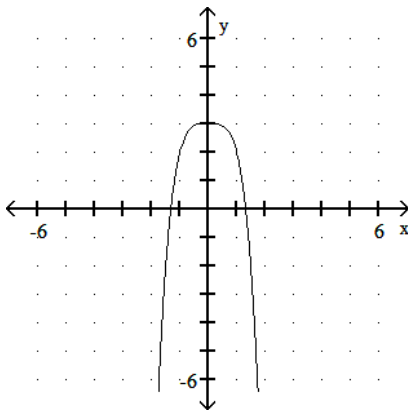
F) Positive; Quartic

G) Negative; Quartic

H) Positive; Cubic

J) Negative; Cubic

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