These multiple choice study questions are intended to offer the student the opportunity to practice problems covered in MAC1105 in a Multiple Choice format. These are not the exam questions nor are they a comprehensive review. Please see the Final Exam Review Packet for a more comprehensive set of study questions. The number of study questions per topic does not necessarily reflect the distribution of problems that will appear on the final exam.

Solutions to these study questions are found at the end of this document.

The common final exam for College Algebra consists of multiple choice and free response questions. A Scantron sheet will be provided for you during the test, but you should bring a couple of good #2 pencils. Students will not be given partial credit for the multiple choice questions; however, students may earn partial credit for the free response questions. NO books, NO formula sheets, and NO notes are allowed during testing!

Directions: Choose the correct solution.

1)   Consider the equation $x^2 + 6x + 11 = 0$. Calculate the discriminant, and determine the number of real solutions.

   a)   The discriminant is -8 and there are no real solutions.
   b)   The discriminant is 0 and there is one real solution.
   c)   The discriminant is 80 and there are two real solutions.
   d)   The discriminant is 8 and there are real solutions.
   e)   The discriminant is 6 and there are two real solutions

2)   Use the graph below to write the equation of the graph in $y = a(x-h)^2 + k$ form.

(1,7)
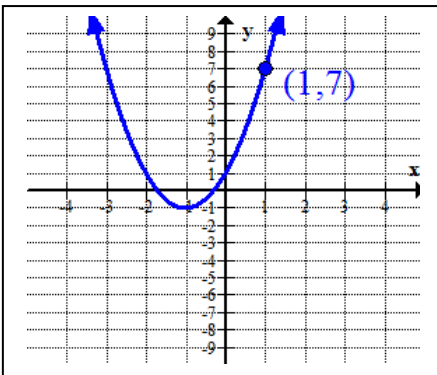
   a) $y = (x+1)^2 + 1$ b) $y = (x+1)^2 - 1$ c) $y = 2(x+1)^2 + 1$

   d) $y = 2(x+1)^2 - 1$ e) $y = (x-1)^2 - 1$

3)   A golf ball is driven so that its height in feet after t seconds is $h(t) = -16t^2 + 48t + 20$. Find the maximum height of the golf ball.

   a)   1.5 feet   b)   -88 feet   c)   56 feet   d)   20 feet
   e)   68 feet

4) Determine which graph(s) is/are one-to-one function?

(A) (B) (C) (D)
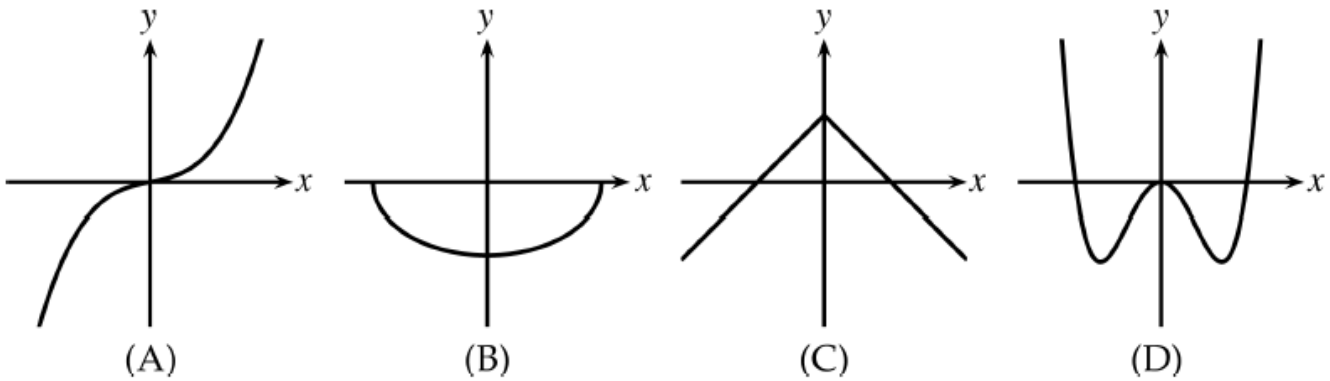
a) A only   b) B only   c) C only   d) D only   e) all of the graphs

5) The average value of a certain automobile was $13,740 in 1994 and depreciated to $6960 in 1998. Let y be the average value of the automobile in the year x, where $x=0$ represents 1994. Write a linear equation that models the value of the automobile in terms of the year x.

$$a) \quad y = -\frac{1}{1695}x + 13740 \qquad b) \quad y = -1695x + 13740 \qquad c) \quad y = -1695x + 180$$

$$d) \quad y = -1695x + 6960 \qquad e) \quad y = -\frac{1}{1695}x - 6960$$

6) The graph gives the tide at a certain beach x hours after midnight on a particular day, where $0 \le x \le 27$. When where the water level increasing?
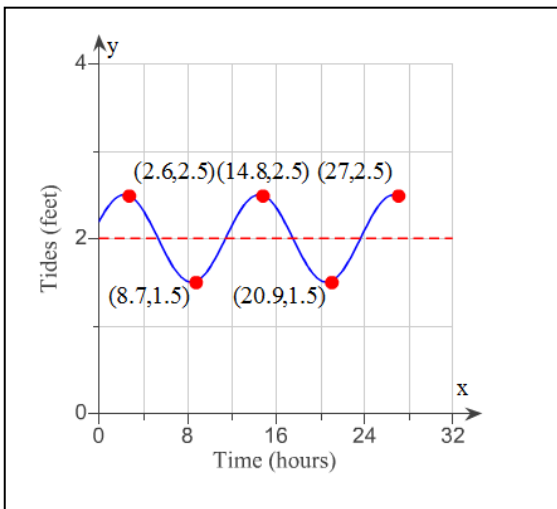
$$a) \quad (0, 2.6) \cup (8.7, 14.8) \cup (20.9, 27)$$

$$b) \quad (2.6, 8.7) \cup (14.8, 20.9)$$

$$c) \quad [2.6, 8.7] \cup [14.8, 20.9]$$

$$d) \quad (8.7, 14.8) \cup (20.9, 27)$$

$$e) \quad (0, 2.6) \cup (20.9, 27)$$

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7) It can be show that there is strong association between life expectancy and the year a person was born. In the table below, the year and life expectancy from several years are given. Use the data and the regression capabilities of your graphing calculator to find the best-fit model for the data, then use the data to predict the life expectancy in the year 2020. Let the independent variable, x, represent years since 1900.

Year (x)	0 (1900)	20 (1920)	40 (1940)	60 (1960)	80 (1980)
Life Expectancy in years (y)	49.4	51.7	53.3	54.5	55.5

a) $y = 49.88 + 0.075x$; 72.38 years

b) $y = 0.075x + 49.88$; 58.88 years

c) $y = 0.075x - 92.62$; 65.43 years

d) $y = 49.88x + 0.075$; 58.88 years

e) $y = 1.29x - 64.47$; 48.99 years

8) Given the following exponential function $Q = 1000(2)^{\frac{t}{50}}$ and t is measured in years, how long will it take the quantity to double?

a) 100 years   b) 50 years   c) 2 years   d) 1 year   e) 200 years

9) A company that manufactures small canoes has a fixed cost of $20,000. It costs $40 to produce each canoe. The selling price is $80 per canoe. If we let $C(x)$ represent the total cost to produce x units and $R(x)$ represent the total revenue on the sale of x units, which of the following systems of equations could be used to find the break-even point (where revenue equals cost)? Find the break-even point by solving the system of equations.

a) $C(x) = 40x$; $R(x) = 80x$; break-even point $= (500$ units, $\$20,000)$

b) $C(x) = 20,000$; $R(x) = 40x$; break-even point $= (5000$ units, $\$200,000)$

c) $C(x) = 20,000 + 40x$; $R(x) = 80 + x$; break-even point $= (500$ units, $\$40,000)$

d) $C(x) = 20,000 + 80x$; $R(x) = 40x$; break-even point $= (250$ units, $\$10,000)$

e) $C(x) = 20,000 + 40x$; $R(x) = 80x$; break-even point $= (500$ units, $\$40,000)$

10) The initial amount of a substance is 290 grams. The half-life of the substance is 8 days. Choose the correct equation for the amount of substance remaining, A, after t number of days.

a) $A = 290\left(\dfrac{1}{2}\right)^{t}$

b) $A = 290\left(\dfrac{1}{2}\right)^{\frac{t}{8}}$

c) $A = 290\left(\dfrac{1}{2}\right)^{8t}$

d) $A = 290(2)^{t}$

e) $A = 290 + 8t$

11) The current, I , is an electrical conductor varies inversely as the resistance, R , of the conductor. The current is 6 ampere when the resistance is 800 ohms. What is the current when the resistance is 358 ohms?

a)   2.7 amperes   b)   0.37 amperes   c)   13.4 amperes

d)   59.7 amperes   e)   0.07 amperes

12) The Volume of a sphere is $V(r)=\dfrac{4}{3}\pi r^3$ where r is the radius of the sphere. If the radius is tripled, what happens to the volume of the sphere?

a)   The volume is multiplied by 27.   b)   The volume is multiplied by 3.

c)   The volume is divided by 3.   d)   The volume is multiplied by 9.

e)   Nothing happens to the volume.

13) Use the properties of logarithms to expand the following expression: $\log\left(\dfrac{x^2 y^{\frac{1}{2}}}{z^4}\right)$
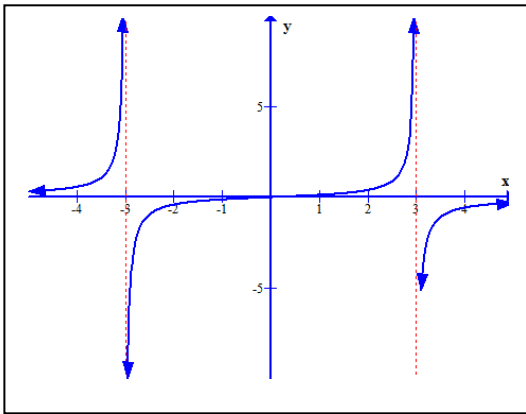
a) $\log 2x + \log\dfrac{1}{2}y - \log 4z$ b) $2\log x + \dfrac{1}{2}\log y - 4\log z$

c) $2\log x - \dfrac{1}{2}\log y - 4\log z$ d) $\log 2x - \log\dfrac{1}{2}y - \log 4z$

e) $\log x + \log y - \log z$

14) Write the completed factored form of the polynomial in the graph below. The leading coefficient is either 1 or -1 and integer zeros.
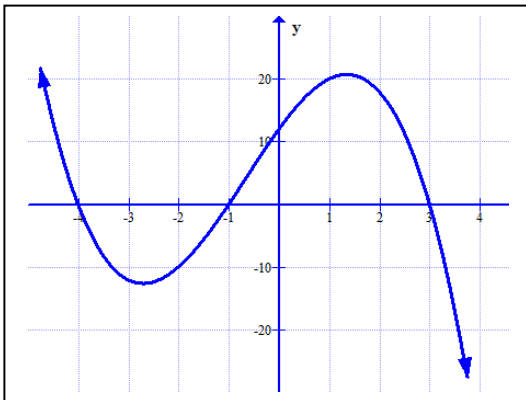

a) $y = (x-4)(x-1)(x+3)$

b) $y = -(x-4)(x-1)(x+3)$

c) $y = (x+4)(x+1)(x-3)$

d) $y = -(x+4)(x+1)(x-3)$

e) $y = -(x+10)(x+20)(x-3)$

15)   Given the graph of the following rational function, select the statement that is true.

a)   The domain of the rational function is $(-\infty, \infty)$.

b)   The rational function contains a vertical asymptote at $x = 0$.

c)   The rational function contains a horizontal asymptote at $y = 3$.

d)   The rational function contains a vertical asymptote at $x = -3$.

e)   The rational function contains a vertical asymptote at $y = -3$

16)   Below is the graph of a polynomial function. Which statement is true?
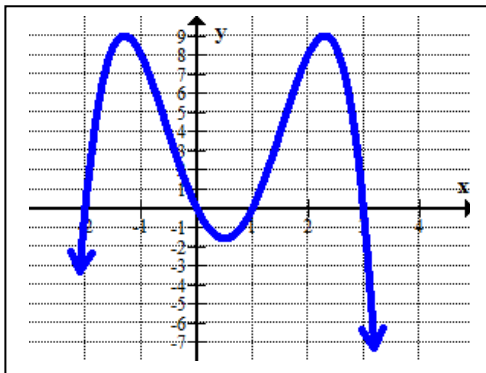
a)   The leading coefficient is positive.

b)   There is a zero when $x = 4$.

c)   The minimum degree of the polynomial is 4.

d)   There are four turning points in this polynomial.

e)   All of the above statements are true.

17)   What is the domain and range of the function $y = \sqrt{4 - x}$?

_____The domain is   _____The range is

$a)$ $(-\infty, \infty)$ $b)$ $(-\infty, 4]$ $c)$ $(-\infty, 4)$ $d)$ $[4, \infty)$ $e)$ $[0, \infty)$

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18) Find C and a so that $f(x) = Ca^x$ satisfies $f(0) = 3$ and $f(2) = 12$.

a) $C = 12,\ a = 3$ b) $C = 4,\ a = 3$ c) $C = 3,\ a = 2$

d) $C = 2,\ a = 3$ e) $C = 3,\ a = 4$

19) Determine the final value of $2000 invested at 3% compounded quarterly for 2 years. The formula for compounded interest is $A = P\left(1 + \dfrac{r}{n}\right)^{nt}$.

a) $2123.20   b) $2120   c) $8480   d) $2480

e) $12,505.30

20) Let $f(x)$ compute the time in hours to travel x miles at 52 miles per hour. What does $f^{-1}(x)$ compute?

a) The miles traveled in x hours at 52 miles per hour.
b) The hours to travel x miles.
c) The hours to travel 52 miles.
d) The miles traveled in x hours.
e) The hours it took to travel 52 miles

21) Use $f(x) = 7x - 5$, find $f^{-1}(x)$.

a) $f^{-1}(x) = 7x - 12$ b) $f^{-1}(x) = \dfrac{x+5}{7}$ c) $f^{-1}(x) = \dfrac{1}{7x-5}$

d) $f^{-1}(x) = -7x + 5$ e) $f^{-1}(x) = \dfrac{x-5}{7}$

22) Use the table to evaluate $(f \circ g)(-1)$.

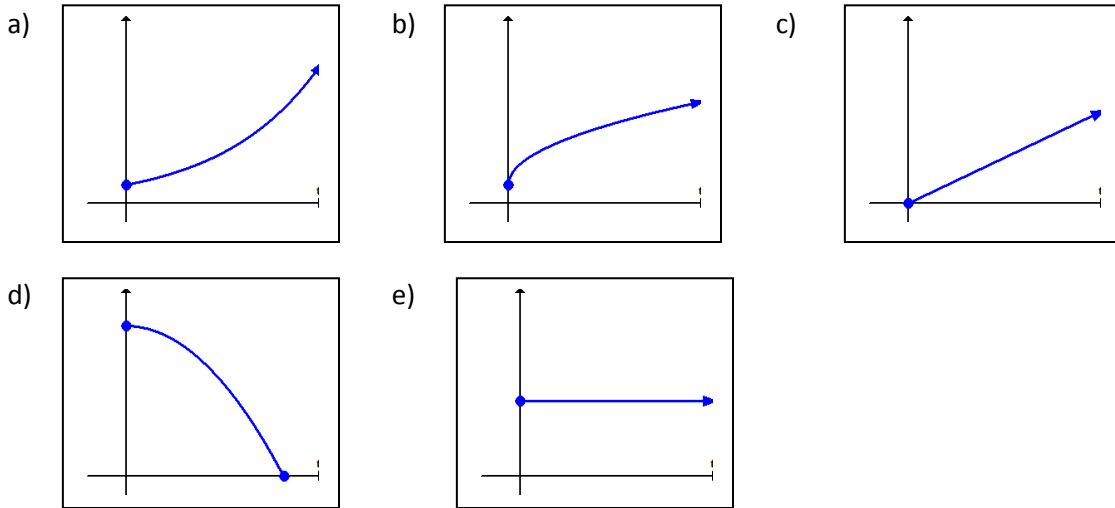| x	-2	-1	0	1	2
$f(x)$	5	2	-3	2	4
$g(x)$	2	1	4	0	-3

a) -3   b) 0   c) 4   d) 2   e) -1

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23) A car travels a distance of 100 miles with cruise control keeping the speed constant. The dependent variable represents the speed of the car. The independent variable represents time. Which of the following graphs best matches the description?

a)

b)

c)

d)

e)

24) The function $P(t) = 21000 + 1800t$, computes the population of a city from years 1980-2001, with $t = 0$ representing 1980. Find the relevant range for this function.
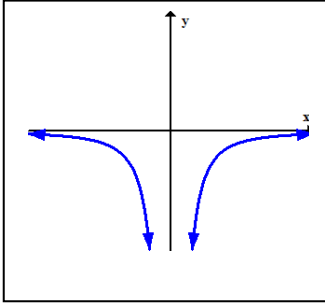
a)   [0, 21]   b)   [21000, 58800]   c)   (0, 21)

d)   [0, 20]   e)   [0, 21000]

25) The graph of a quadratic function in the form $f(x) = ax^2 + bx + c$ is given below. Which statement is true?
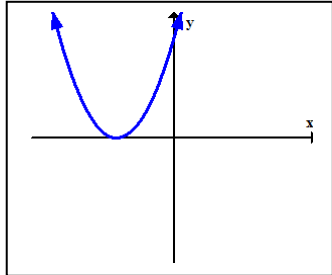
a)   The value of a must be negative.

b)   The value $b^2 - 4ac = 0$

c)   The value $f\left(\dfrac{-b}{2a}\right) < 0$

d)   The value $-\dfrac{b}{2a} > 0$

e)   all of the statements a-d are false

26) The graph below represents a power function in the form $y = kx^p$, where k and p are constants. Which statement is true?

    a)   The value of p is negative.

    b)   The value of k is negative.

    c)   The value of p is even.

    d)   The range is $(-\infty, 0)$

    e)   The statements, a-d, are true.

27) A substance currently consists of 100 grams, and it decays at a continuous rate of 7% per year. Determine the number of years it will take for the amount of the substance to decrease to 40 grams of its current amount. (If necessary, round the answer to one decimal place.)

    a)   13.1 years   b)   13.5 years   c)   12.63 years   d)   30.1 years

    e)   35.6 years

28) Solve the equation for x: $\ln x = -2$. (If necessary, round the answer to two decimal places.)

    a)   no solution   b)   7.4   c)   -2   d)   0.14

    e)   6.5

29) Given the exponential function $y = 50(2)^x$, select the statement that is correct.

    a)   The initial amount is 2.

    b)   The growth rate is 200%.

    c)   The vertical intercept is (0,2).

    d)   The growth factor is 2.

    e)   The decay rate is 10%

Answer Key:

1)	a	11)	c	21)	b
2)	d	12)	a	22)	d
3)	c	13)	b	23)	e
4)	a	14)	d	24)	b
5)	b	15)	d	25)	b
6)	a	16)	c	26)	e
7)	b	17)	domain: b; range: e	27)	a
8)	b	18)	c	28)	d
9)	e	19)	a	29	d
10)	b	20)	a		