MAC 1105
Final Review

1. Solve: $-x^2 + 3x - 2 \geq 0$
   a. $(1, 2)$
   b. $[1, 2]$
   c. $[-1, -2]$
   d. $(-\infty, 1) \cup (2, \infty)$

2. Solve: $|x + 2| < 1$
   a. $[-3, -1]$
   b. $[-3, 1)$
   c. $(-\infty, -3) \cup (1, \infty)$
   d. $(-3, -1)$

3. If $c = \dfrac{a + 2b}{ab - 1}$ then $b =$
   a. $b = \dfrac{a + c}{ac - 2}$
   b. $b = \dfrac{a + 2b + c}{ac}$
   c. $b = \dfrac{acb - a - 1}{2}$
   d. $b = \dfrac{a - c}{a - 1}$

4. Solve and graph: $|2x - 1| \geq 3$

   a. $[2, \infty)$

   b. $[-1, 2]$

   c. $(-\infty, -1] \cup [2, \infty)$

   d. $(-1, 2)$

5. Solve the equation $2x^3 - 5x^2 + x + 2 = 0$ given that 2 is a zero of $f(x) = 2x^3 - 5x^2 + x + 2$

   a. $\left\{-1, -\frac{1}{2}, 2\right\}$

   b. $\left\{-1, \frac{1}{2}, 2\right\}$

   c. $\left\{\frac{1}{2}, 1, 2\right\}$

   d. $\left\{-\frac{1}{2}, 1, 2\right\}$

6. Solve:
$$\begin{aligned} x + 3y - z &= 1 \\ x - y + 2z &= -4 \\ 2x + y + 3z &= 2 \end{aligned}$$

   a. $(-9, 5, 5)$

   b. $(5, -9, 5)$

   c. $(8, 5, -8)$

   d. $(-8, 4, 4)$

7. A stone is thrown upward from the top of a 112-foot tall building with an initial velocity of 96 feet per second. The height of the stone above the ground after t seconds is given by the position function $s(t) = -16t^2 + 96t + 112$. When does the stone reach its max. height? What is the max. height?

   a. At $t = 0$ sec; max. height: $s(0) = 112$ ft

   b. At $t = 3$ sec; max. height: $s(3) = 256$ ft

   c. At $t = 7$ sec; max. height: $s(7) = 0$ ft

   d. At $t = 1$ sec; max. height: $s(1) = 192$ ft

8. Find the domain of the following function: $f(x) = \dfrac{x-2}{x^2+4x+4}$.

   a. $(-\infty, -2] \cup (-2, \infty)$

   b. $(-\infty, 2) \cup (2, \infty)$

   c. $(-\infty, -2) \cup (-2, \infty)$

   d. $(-\infty, 2] \cup (2, \infty)$

9. $f(x) = \dfrac{2x}{x-1}$. Evaluate: $f(-3) - f(-1)$.

   a. -2

   b. -4

   c. $\dfrac{1}{2}$

   d. $\dfrac{5}{2}$

10. The range of the function given by $y = -2(x + 1)^2 - 3$ is:
    a. $(-\infty, \infty)$
    b. $(-\infty, -1]$
    c. $[-3, \infty)$
    d. $(-\infty, -3]$

11. The revenue R from the sale of x units of a product is given by $R = 3x^2 + x$. The cost of producing x units of the product is given by $C = 2x^2 - 2x + 18$. How many units must the company produce and sell to break even?
    a. $x = 4$
    b. $x = 3$
    c. $x = 6$
    d. $x = 10$

12. Solve for x: $\left|\frac{2-x}{3}\right| = 1$
    a. {-1, 5}
    b. {1, -5}
    c. $\{0, \frac{1}{3}\}$
    d. $\{\frac{1}{2}, \frac{1}{3}\}$

13. Solve: $-13 + 3e^x = 11$
    a. $x = \ln\left(\frac{2}{3}\right)$
    b. $x = \ln 3$
    c. $x = 8$
    d. $x = \ln 8$

14. Write the equation of the line with slope $m = \frac{1}{2}$ and y-intercept (0, –3).

a. $x = -3$

b. $x - 2y - 6 = 0$

c. $2x - y - 3 = 0$

d. $y = -3$

15. The demand equation for a certain product is modeled by $p = 500 - 0.5e^{0.004x}$. Find the demand x for a price $p = 450$.

a. $x = 1151$

b. $x = 50$

c. $x = 100$

d. $x = 10$

16. Find the equation of the line with slope $-\frac{3}{4}$ passing through the point (–2, 3).

a. $4x + 3y - 6 = 0$

b. $3x + 4y + 6 = 0$

c. $3x + 4y - 6 = 0$

d. $3x - 4y - 6 = 0$

17. Write an equation of the line through the point (2, 8) that is perpendicular to the line $y = \frac{-2}{5}x + 3$.

a. $5x + 2y + 6 = 0$

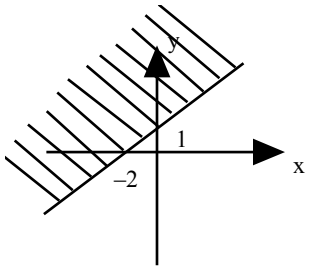
b. $5x - 2y + 6 = 0$

c. $5x + 2y - 6 = 0$

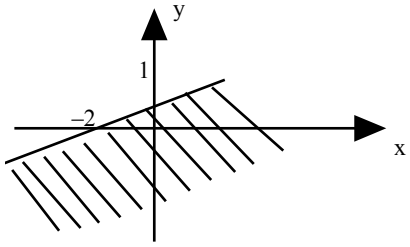
d. $5x - 2y - 6 = 0$

18. Graph the following inequality: $x - 2y + 2 \leq 0$

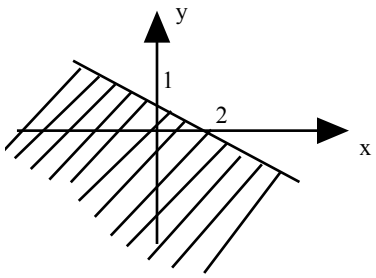
a.



b.



c.



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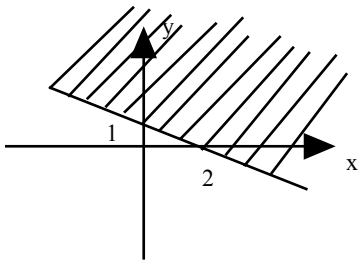


19. At how many points do the graph of the following two equations intersect?

$y = x^2 - 2$

$y = -2x^2 + 6x + 7$

a. one
b. two
c. three
d. none

20. At how many points do the graph of the following two equations intersect?

$x^2 - y = 0$
$2x - y = 2$

a. one
b. two
c. three
d. none

21. $f(x) = \frac{3}{x^2 - 1}$ and $g(x) = \frac{1}{x+1}$. Find $(f+g)(x)$.

a. $\frac{4}{x^2 + x}$

b. $\frac{4}{(x^2 - 1)(x+1)}$

c. $\frac{x}{x^2 - 1}$

d. $\frac{x+2}{x^2 - 1}$

22. Find the vertex of the graph of the following quadratic function. $f(x) = 2x^2 + 8x + 7$

a. $(2,1)$

b. $(-1,-2)$

c. $(-2,-1)$

d. $(1,7)$

23. Find the zeros of the following polynomial function and state whether the graph crosses the x-axis or touches the x-axis and turns around at each zero.

$$f(x) = 3(x+5)(x+2)^2$$

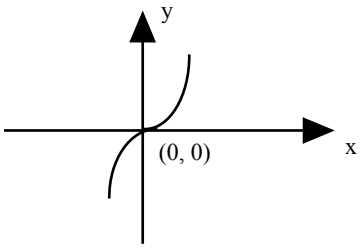
a. $x = -5$ crosses; $x = -2$ touches

b. $x = -2$ crosses; $x = -5$ touches

c. $x = 3$, $x = -5$ crosses; $x = -2$ touches

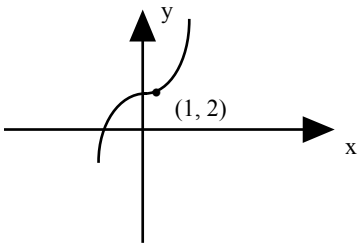
d. $x = 5$ crosses; $x - 2$ touches

24. Use the graph of $y = f(x) = x^3$

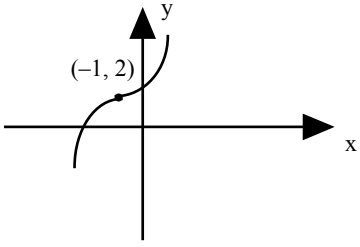


to graph: $y = f(x + 1) + 2$

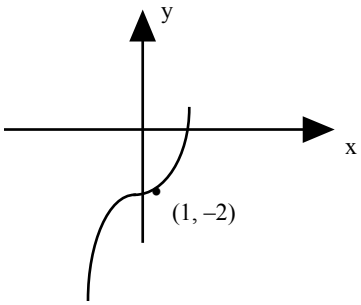
a.



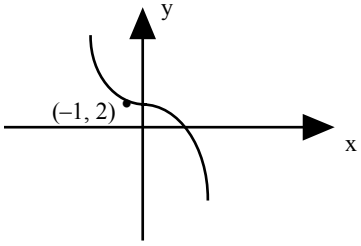
b.



c.



d.



25. Solve for x: $\frac{x}{2} - \frac{3x+1}{3} > 2$

a. $(-\infty, \frac{-14}{3}]$

b. $(-\infty, 4)$

c. $(-\infty, \frac{14}{3})$

d. $(-\infty, \frac{-14}{3})$

26. Solve: $\frac{6}{x} = 2 + \frac{3}{x+1}$

a. $\{-\frac{3}{2}, 2\}$

b. $\{0, -1\}$

c. $\{\frac{3}{2}, -2\}$

d. $\{\frac{1}{2}\}$

27. Solve: $\sqrt{y-7} + \sqrt{y} = 7$

a. $\{-2, 2\}$

b. $\{16\}$

c. $\{-16, 16\}$

d. $\{4\}$

28. To solve $\sqrt{18x+5} - 9x = 1$, what quadratic would you use?

a. $81x^2 - 18x - 4 = 0$

b. $81x^2 + 18x - 4 = 0$

c. $81x^2 - 4 = 0$

d. $81x^2 + 4 = 0$

29. Solve: $6x^{2/3} + 5x^{1/3} - 4 = 0$

a. $\left\{ -\frac{1}{8}, \frac{64}{27} \right\}$

b. $\left\{ \frac{1}{8}, -\frac{64}{27} \right\}$

c. $\left\{ -\frac{4}{3}, \frac{1}{2} \right\}$

d. $\left\{ \frac{4}{3}, -\frac{1}{2} \right\}$

30. Simplify: $\frac{2-i}{3+i}$

a. $2 + i$

b. $\frac{5}{8} - \frac{1}{8}i$

c. $\frac{7}{10} - \frac{1}{10}i$

d. $\frac{1}{2} - \frac{1}{2}i$

31. At what interest rate can one double his/her initial deposit after 3 years, if the interest is compounded semiannually?

a. r = 24.5%

b. r = .245%

c. r = 112.25%

d. r = 1.12%

32. Find $f^{-1}(x)$ if $f(x) = \frac{3x - 2}{x}$

a. $f^{-1}(x) = \frac{2}{3 - x}$

b. $f^{-1}(x) = \frac{2}{x - 3}$

c. $f^{-1}(x) = \frac{x - 3}{2}$

d. $f^{-1}(x) = \frac{x - 2}{3}$

33. Find $f^{-1}(x)$ if $f(x) = \sqrt[3]{x} - 1$

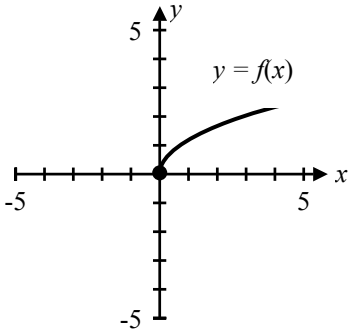
a. $f^{-1}(x) = (x - 1)^3$

b. $f^{-1}(x) = x^3 - 1$

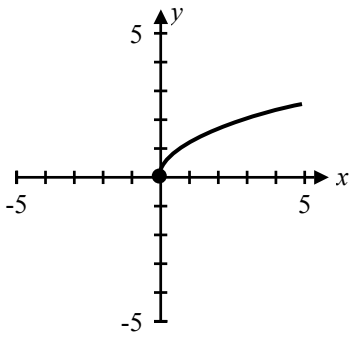
c. $f^{-1}(x) = (x + 1)^3$

d. $f^{-1}(x) = x^3 + 1$

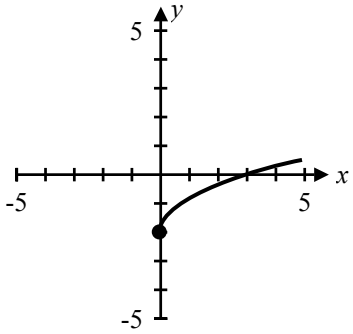
34. Use the graph of $y = f(x)$ below to graph $y = f(x) - 2$.



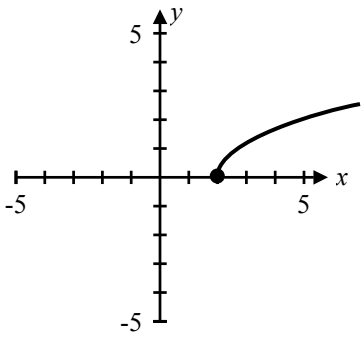
a.



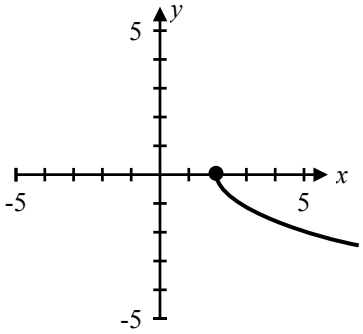
b.



c.



d.



35. What x value(s) will satisfy the following system?

$$x^2 + 4x - y = 7$$
$$2x - y = -1$$

a. $\{-2,\ 4\}$
b. $\{0,\ 2\}$
c. $\{-4,\ 0\}$
d. $\{-4,\ 2\}$

36. Solve for x: $\ln 2x - \ln (x + 5) = 0$
a. no solution
b. $x = 0$
c. $x = 5$
d. $x = 2$

37. Solve for x: $\dfrac{1}{3^{x+1}} = 27$
a. $x = 2$
b. $x = -2$
c. $x = -4$
d. no solution

38. Express $\dfrac{1}{2}\ln x + \ln y - 2\ln z$ as the single logarithmic quantity.

a. $\ln \dfrac{\sqrt{x}\,y}{\sqrt{z}}$

b. $\ln \dfrac{\sqrt{x}\,y}{z^2}$

c. $\ln \dfrac{\sqrt{xy}}{z^2}$

d. $\ln \dfrac{x^2y}{\sqrt{z}}$

39. Divide: $\dfrac{2y^5 - 3y^4 + y^2 + 1}{y + 2}$

a. $Q(x) = 2y^4 - 7y^3 - 27y^2 + 54y - 107$; R = 0

b. $Q(x) = 2y^4 - 7y^3 + 14y^2 - 27y + 54$; R = –107

c. $Q(x) = 2y^4 - 7y^2 + 15$; R = –29

d. $Q(x) = 2y^4 - 7y^2 + 15y + 29$; R = 0

40. Find all of the asymptotes of: $f(x) = \dfrac{3x^2 + 2}{x^2 - 1}$.

a. $x = 1, x = -1, y = 1$

b. $x = 1, x = -1, y = \dfrac{3}{2}$

c. $x = 1, x = -1, y = -2$

d. $x = 1, x = -1, y = 3$

41. Given $f(x) = x^2 - 3x + 2$ and $g(x) = x - 2$, find $\left(\dfrac{f}{g}\right)(4)$.

a. $4(x - 1)$

b. 3

c. $\dfrac{x - 1}{4}$

d. $4(x - 2)$

42. Solve: $\dfrac{2x}{x + 1} \leq 1$

a. $(-\infty, -1] \cup [1, \infty)$

b. $(-1, 1]$

c. $(-\infty, -1]$

d. $[1, \infty)$

43. Find the x-intercept(s) of the graph of the following quadratic function: $f(x) = 2x^2 + 2x - 1$.

a. none

b. $\left(\frac{-1 \pm 2\sqrt{3}}{2}, 0\right)$

c. $(-1 \pm \sqrt{3}, 0)$

d. $\left(\frac{-1 \pm \sqrt{3}}{2}, 0\right)$

44. $f(x) = \frac{1}{x+2}$ and $g(x) = x + 2$. Find $(f \circ g)(0)$.

a. $2\frac{1}{4}$

b. $\frac{1}{4}$

c. 4

d. $\frac{1}{6}$

45. It takes John 10 more days than it takes Mary to do the same job. Working together, they take 12 days. Working alone, how long would it take Mary to complete the job.

a. 16 days

b. 32 days

c. 20 days

d. 8 days

46. A varies directly as B and inversely as the square of C. A = 7 when B = 9 and C = 6.

Find A when B = 4 and C = 8.

a. A = 28
b. A = 14
c. A = $\frac{7}{16}$
d. A = $\frac{7}{4}$

47. Suppose that you have $8000 to invest. What investment yields the greater return over 3 years: 7% compounded monthly or 6.85% compounded continuously? And by how much?

a. monthly, $6.02
b. monthly, $38.29
c. continuously, $0.02
d. monthly, $16.02

48. W varies directly with the square root of x and inversely with y. W = 4, when x = 1 and y = 2. Find the constant of variation.

a. $k = \frac{1}{8}$
b. $k = 8$
c. $k = 2$
d. $k = \frac{1}{2}$

49. Find the domain of the following function: $f(x) = \sqrt{2x-3}$.

a. $\left(\frac{3}{2}, \infty\right)$
b. $\left(-\infty, \frac{3}{2}\right]$
c. $\left[\frac{3}{2}, \infty\right)$
d. $\left(-\infty, \frac{3}{2}\right)$

50. Solve: $\log x + \log (x - 21) = 2$

a. {25}

b. {–4, 25}

c. {4}

d. {–25, 4}

51. $I = \dfrac{En}{Rn + r}$; Solve for n.

a. $\dfrac{Ir}{E - IR}$

b. $\dfrac{E - IR}{Ir}$

c. E – 1

d. $\dfrac{1}{E}$

52. Write $y = 2x^2 + 2x - 1$ in standard form. Find the coordinates of the vertex.

a. $y = 2\left(x + \dfrac{1}{4}\right)^2 - \dfrac{1}{2}; \quad V\left(-\dfrac{1}{4}, -\dfrac{1}{2}\right)$

b. $y = 2\left(x + \dfrac{1}{2}\right)^2 - \dfrac{3}{2}; \quad V\left(\dfrac{1}{2}, \dfrac{3}{2}\right)$

c. $y = 2\left(x - \dfrac{1}{4}\right)^2 - \dfrac{3}{2}; \quad V\left(-\dfrac{1}{4}, -\dfrac{3}{2}\right)$

d. $y = 2\left(x + \dfrac{1}{2}\right)^2 - \dfrac{3}{2}; \quad V\left(-\dfrac{1}{2}, -\dfrac{3}{2}\right)$

53. Find the domain, the vertical asymptote, and the x-intercept of the following logarithmic function. $f(x) = \ln (2 + x)$.

a. Domain: $[-2, \infty)$; Vertical asymptote: $x = -2$; x-intercept: $(-3, 0)$

b. Domain: $(-2, \infty)$; Vertical asymptote: $x = 0$; x-intercept: $(-3, 0)$

c. Domain: $(-\infty, -2)$; Vertical asymptote: $x = -2$; x-intercept: $(-2, 0)$

d. Domain: $(-2, \infty)$; Vertical asymptote: $x = -2$; x-intercept: $(-1, 0)$

54. Solve for k in $\frac{A}{2} = Ae^{0.5750k}$. (Round your answer to three decimal places.)

a. $k = 1.205$

b. $k = -1.205$

c. $k = 8295.496$

d. $k = -8295.496$

55. The function $N(t) = \frac{200,000}{1 + 1999e^{-0.06t}}$ describes the number of people $N(t)$ who became ill with an infectious disease t days after its initial outbreak. How many people were ill by the end of the fourth day?

a. 100 people

b. 27 people

c. 270 people

d. 127 people

56. Which response below is true regarding the graph of this system?

$2x + y \leq 6$

$x + y \geq 4$

$x \geq 0$

$y \geq 0$

a. The graph consists of all points inside and on the border of two triangles.

b. The graph consists of all points inside and on the border of just one triangle.

c. The graph is a four-sided figure.

d. All points on the positive part of the y-axis are in the graph.

57. Solve for x: $9^{x-1} = 4$

a. $1 + \frac{\ln 4}{\ln 9}$

b. $\frac{\ln 5}{\ln 9}$

c. $\ln 4 - \ln 9 + 1$

d. $1 + \frac{\ln 9}{\ln 4}$

58. Which of the following is (are) true?

I. The graph of f(x) = x^2 is symmetric about y-axis.
II. The graph of f(x) = x^3 is symmetric through the origin.

a. only I
b. only II
c. both I and II
d. none

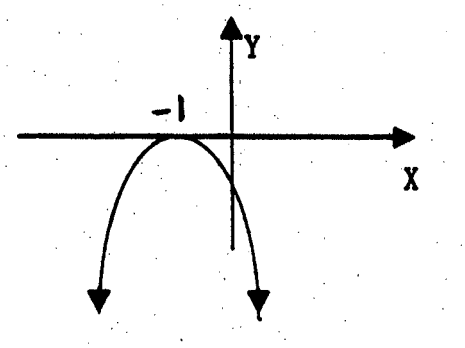
59. You have 200 feet of fencing to build a rectangular enclosure. Determine the dimensions of the rectangle that make its area 1600 square feet.
a. l = 40 ft, w = 40 ft
b. l = 160 ft, w = 10 ft
c. l = 20 ft, w = 20 ft
d. l = 80 ft, w = 20 ft

60. Find the zeros of the following rational function. $f(x) = \dfrac{8x+3}{11-x}$

a. $x = \left\{\dfrac{-3}{8},\ 11\right\}$
b. $x = \left\{\dfrac{-3}{8}\right\}$
c. $x = \{11\}$
d. No zeros

61. $f(x) = x^2 + 1$ and $g(x) = x - 4$. Find $(fg)(-6)$.
a. 27
b. –74
c. 74
d. –370

62. Use the graph to find the domain, x-intercept, and interval where the function is decreasing



a. Domain: $(-\infty, -1)$; x-intercept: $(-1, 0)$; Decreasing in: $(-\infty, -1)$
b. Domain: $(-\infty, -1)$; x-intercept: $(-1, 0)$; Decreasing in: $(-1, -\infty)$
c. Domain: $(-\infty, \infty)$; x-intercept: $(-1, 0)$; Decreasing in: $(-1, \infty)$
d. Domain: $(-\infty, \infty)$; x-intercept: $(-1, 0)$; Decreasing in: $(-\infty, -1)$

63. Use Leading Coefficient Test to determine the graph's end behavior.

$y = f(x) = -2(x - 4)(x + 2)$

a. falls to the left and rises to the right
b. falls to the left and right
c. rises to the left and right
d. falls to the right and rises to the left

MAC 1105 – College Algebra
Final Review Answers

1.	b	18.	a	35.	d	52.	d
2.	d	19.	b	36.	c	53.	d
3.	a	20.	d	37.	c	54.	b
4.	c	21.	d	38.	b	55.	d
5.	d	22.	c	39.	b	56.	b
6.	a	23.	a	40.	d	57.	a
7.	b	24.	b	41.	b	58.	c
8.	c	25.	d	42.	b	59.	d
9.	c	26.	a	43.	d	60.	b
10.	d	27.	b	44.	b	61.	d
11.	b	28.	c	45.	c	62.	c
12.	a	29.	b	46.	d	63.	b
13.	d	30.	d	47.	b		
14.	b	31.	a	48.	b		
15.	a	32.	a	49.	c		
16.	c	33.	c	50.	a		
17.	b	34.	b	51.	a		