

A2 CC Midterm Review! Part II

Complete on a SEPARATE SHEET of paper. Any questions that are graphs can be complete on this sheet.

- 31) Solve the system of equations algebraically for x and y.
 $(x - 2)^2 + (y - 3)^2 = 16$
 $x + y = 1$
- 32) If $f(x)$ is an even function, which function must also be even?
 (1) $f(x-2)$ (2) $f(x)+3$ (3) $f(x+1)$ (4) $f(x+1)-3$
- 33) If f and g are two functions defined by $f(x) = 3x + 5$ and $g(x) = x^2 + 1$, then $g(f(x))$ is:
- 34) When $b > 0$ and d is a positive integer, the expression $(3b)^{\frac{2}{3}}$ is equivalent to
 (1) $\frac{1}{(\sqrt[4]{3b})^2}$ (2) $(\sqrt[3]{3b})^d$ (3) $\frac{1}{\sqrt[3]{3b^d}}$ (4) $(\sqrt[4]{3b})^2$
- 35) What is the value of $\sum_{x=0}^2 (3 - 2a)^x$?
- 36) a) State the interval(s) of increase in interval notation.
 b) State the end behavior of the function.
 c) State the y-intercept.
 d) State the roots.
-
- 37) Simplify the expression $6xi^3(-4xi + 5)$.
- 38) Solve the following equation in simplest a + bi form: $4x(x + 2) = -7$
- 39) If the roots of the quadratic $ax^2 + bx + c = 0$ are real, irrational, and unequal, then the discriminant is
 (1) equal to zero (3) greater than zero and a perfect square
 (2) less than zero (4) greater than zero and not a perfect square
- 40) Write the following arithmetic series using summation notation: $5 + 7 + 9 + 11 \dots + 43?$
- 41) Solve the systems of equations:
 $4x + 4y + z = 24$
 $2x - 4y + z = 0$
 $5x - 4y - 5z = 12$
- 42) Solve the equation algebraically: $x + \sqrt{9-2x} = 3$
- 43) Solve the equation $x^2 = 23 - 10x$ by completing the square in simplest radical form.
- 44) Factor: $2x^2 + 3x^2 - 8x - 12$
- 45) Write the solution set of the inequality $x^2 + 4x - 5 < 0$ in set notation.
- 46) Solve the system of equations algebraically.
 $x + y = 5$
 $(x + 3)^2 + (y - 3)^2 = 53$
- 47) Is the function $f(x) = \frac{x^2 - x}{3x^3 + x}$ even, odd, or neither? Justify algebraically AND graphically.
- 48) If $f(x) = 3x^2 + 4$ and $g(x) = 6x - 5$, then find the following $(f \circ g)(x)$
- 49) Write the expression $\left(x^{\frac{1}{2}}y^{\frac{2}{3}}\right)^{-6}$ without negative exponents nor fractional exponents.
- 50) The 3rd term in a geometric sequence is 45, the 4th term is -135, and the 5th term is 405. Find the sum of the first 7 terms.
- 51) Factor completely $x^3 - 9x^2 - 5x + 45$.
- 52) Write the expression $(x - 5)^2 + 2(x - 5) - 8$ as the product of two binomials.
- 53) Is $\{(2, 7), (3, 1), (5, 4), (1, 9)\}$ a relation, function or one to one function? Explain.
- 54) A rocket is shot vertically into the air. Its height, h , at any time, t , in seconds, can be modeled by the equation $h(t) = -16t^2 + 184t$. Determine, to the nearest tenth, the interval, in seconds, that the rocket reaches a height of 275 feet or greater.

55) Simplify and write without negative exponents: $\frac{x^3y^{-4}}{x^{-3}y^{-2}}$

56) The sum of the first eight terms of the series $3 - 12 + 48 - 192 + \dots$ is

57) The directrix of the parabola $12(y + 3) = (x - 3)^2$ has the equation $y = -6$. Find the coordinates of the focus of the parabola.

58) Given the parent function $f(x)$

a) Describe the transformations of the $f(x)$ if $g(x) = -2f(x + 5) - 2$

b) Given the domain of $f(x)$ is $-2 \leq x \leq 8$ and the range is $4 \leq y \leq 21$. State the new domain and range for $g(x)$.

59) Solve for x : $\int 5^{5x+1} = 25^{x+2}$

60) Evaluate: $\sum_{n=1}^3 n^2 - rx + 2$

More Questions you can do for practice.

61) Factor completely $x^3 - 8x^2 - 4x + 32$.

62) Is $\{(3,5), (4,6), (5,5), (6,6)\}$ a relation, function or one to one function? Explain.

63) A ball is thrown straight up at an initial velocity of 54 feet per second. The height of the ball t seconds after it is thrown is given by the formula $h(t) = 54t - 12t^2$. Find the interval the ball is over 32 feet, to the nearest tenth.

64) Simplify and write without negative exponents: $\frac{(xy^{-3})^2}{x^4y^{-2}}$

65) What is the common difference of the arithmetic sequence $-7x, -4x, -x, 2x, 5x, \dots$?

66) Find the sum for the geometric series described as: $a_1 = 10, n = 6$, and $r = 4$

67) Solve the system of equations algebraically: $y = x - 4$
 $(x + 2)^2 + y^2 = 4$

68) Find the average rate of change over the interval for $-1 \leq x \leq 6$, for the following functions. Order from least to greatest.

a) $f(x) = 7x + 1$ b) $g(x) = x^3 - 4$ c) $h(x) = 4^x$

69) Solve for x : $27^{6-x} = 9^{x-1}$

70) In 2014, the cost to mail a letter was 49¢ for up to one ounce. Every additional ounce cost 21¢. Which recursive function could be used to determine the cost of a 3-ounce letter, in cents?

(1) $a_1 = 49; a_n = a_{n-1} + 21$ (3) $a_1 = 21; a_n = a_{n-1} + 49$

(2) $a_1 = 0; a_n = 49a_{n-1} + 21$ (4) $a_1 = 0; a_n = 21a_{n-1} + 49$

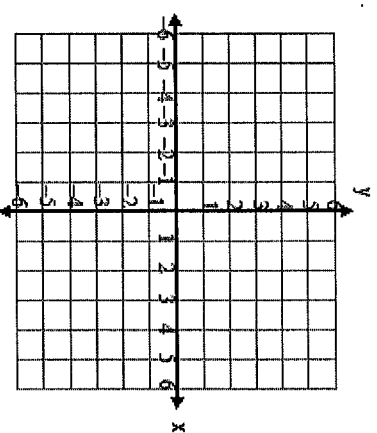
71) Given the function $f(x) = \begin{cases} -5x, & x \leq 1 \\ x^2 - 4, & x > 1 \end{cases}$

a) Algebraically, show how to find the y-intercept.

b) Algebraically, solve each equation to prove/disprove if an x-intercept exists.

c) Graph the function to provide graphically evidence for part a and part b.

d) Describe the end behavior.



72) a) Write the equation of the function that can represent the graph of the parabola in vertex form.

b) State the domain and range in interval notation.

c) Describe the end behavior.

d) State the roots of the graph.

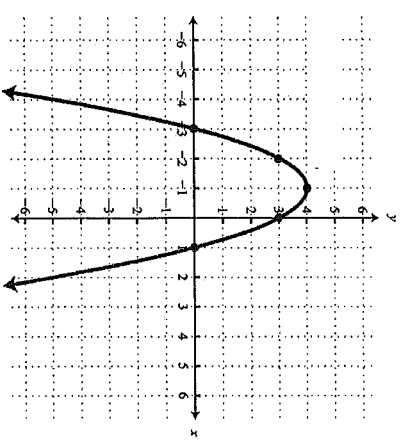
e) State the y-intercept of the graph.

f) What is interval of decrease in set notation?

73) Solve the following equation in simplest a + bi form: $2x^2 = -2(3x + 6)$

74) Factor completely: $8x^3 + 4x^2 - 18x - 9$

75) Simplify $xi(i - 7)^2$, where i is the imaginary unit.



A2 CC Midterm Review! Part II

Complete on a SEPARATE SHEET of paper. Any questions that are graphs can be complete on this sheet.

31) Solve the system of equations algebraically for x and y.

$$\begin{aligned} (x-2)^2 + (y-3)^2 &= 16 \\ x + y &= 1 \end{aligned}$$

$(-1, 3) \quad (9, -1)$

32) If $f(x)$ is an even function, which function must also be even?

- (1) $f(x-2)$ (2) $f(x)+3$ (3) $f(x+1)$ (4) $f(x+1)^{-3}$

33) If f and g are two functions defined by $f(x) = 3x + 5$ and $g(x) = x^2 + 1$, then $gf(f(x))$ is:

$$9x^2 + 36x + 26$$

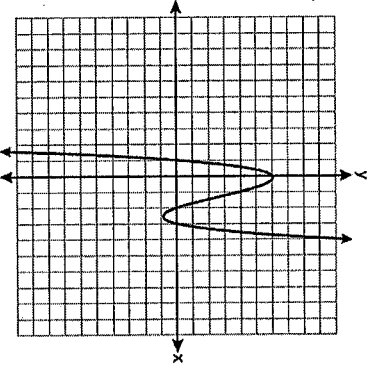
34) When $b > 0$ and d is a positive integer, the expression $(3b)^d$ is equivalent to

- (1) $\frac{1}{(\sqrt[4]{3b})^2}$ (2) $(\sqrt[3]{3b})^d$ (3) $\frac{1}{\sqrt[3]{3b^d}}$ (4) $(\sqrt[4]{3b})^2$

35) What is the value of $\sum_{x=0}^2 (3-2a)^x$? $4a^2 - 14a + 13$

36) a) State the interval(s) of increase in interval notation.

- b) State the end behavior of the function. *on ans.*
 c) State the y-intercept.
 d) State the roots.



37) Simplify the expression $6x^3(4x + 5)$.

$$-24x^2 - 30xi$$

38) Solve the following equation in simplest a + bi form: $4x(x+2) = -7$

$$x = -1 \pm i\sqrt{3}$$

39) If the roots of the quadratic $ax^2 + bx + c = 0$ are real, irrational, and unequal, then the discriminant is

- (1) equal to zero (3) greater than zero and a perfect square
 (2) less than zero (4) greater than zero and not a perfect square

40) Write the following arithmetic series using summation notation: $5 + 7 + 9 + 11 + \dots + 43$?

$$\sum_{n=1}^{20} (2n+3)$$

41) Solve the systems of equations:

$$\begin{aligned} x &= 4 \\ y &= 2 \\ z &= 0 \end{aligned}$$

42) Solve the equation algebraically: $x + \sqrt{9-2x} = 3$ $x = 0$

43) Solve the equation $x^2 = 23 - 10x$ by completing the square in simplest radical form. $x = -5 \pm 4\sqrt{3}$

44) Factor: $2x^2 + 3x^2 - 8x - 12$ $(x+2)(x-2)(2x+3)$

45) Write the solution set of the inequality $x^2 + 4x - 5 < 0$ in set notation. $-5 < x < 1$

46) Solve the system of equations algebraically. $x + y = 5$
 $(x+3)^2 + (y-3)^2 = 53$

47) Is the function $f(x) = \frac{x^2-x}{3x^2+x}$ even, odd, or neither? Justify algebraically AND graphically.

48) If $f(x) = 3x^2 + 4$ and $g(x) = 6x - 5$, then find the following $(f \circ g)(x)$ $108x^2 + 180x + 79$

49) Write the expression $\left(x^{\frac{1}{2}}y^{\frac{2}{3}}\right)^{-6}$ without negative exponents nor fractional exponents. $\frac{14}{x^3}$

50) The 3rd term in a geometric sequence is 45, the 4th term is -135, and the 5th term is 405. Find the sum of the first 7 terms. $S_7 = 9735$

51) Factor completely $x^3 - 9x^2 - 5x + 45$. $(x^2-5)(x-9)$

52) Write the expression $(x-5)^2 + 2(x-5) - 8$ as the product of two binomials. $(x-1)(x-7)$

53) Is $\{(2,7), (3,1), (5,4), (1,9)\}$ a relation, function or one to one function? Explain.

54) A rocket is shot vertically into the air. Its height, h , at any time, t , in seconds, can be modeled by the equation $h(t) = -16t^2 + 184t$. Determine, to the nearest tenth, the interval, in seconds, that the rocket reaches a height of 275 feet or greater. $1.8 \leq t \leq 9.7 \text{ sec.}$

55) Simplify and write without negative exponents: $\frac{x^3 y^{-4}}{x^{-3} y^{-2}} = \frac{x^8}{y^2}$

56) The sum of the first eight terms of the series $3 - 12 + 48 - 192 + \dots$ is $S_8 = -39321$

57) The directrix of the parabola $12(y+3) = (x-3)^2$ has the equation $y = -6$. Find the coordinates of the focus of the parabola. **(3,0)**

58) Given the parent function $f(x)$
 a) Describe the transformations of the $f(x)$ if $g(x) = -2f(x+5) - 2$ **on ans. sheet**
 b) Given the domain of $f(x)$ is $-2 \leq x \leq 8$ and the range is $4 \leq y \leq 21$. State the new domain and range for $g(x)$.

59) Solve for x : $5^{5x+1} = 25^{x+2}$ $x = 1$

60) Evaluate: $\sum_{n=1}^3 n^2 - nx + 2 = -10x + 18$

More Questions you can do for practice.

61) Factor completely $x^3 - 8x^2 - 4x + 32$. **$(x+2)(x-2)(x-8)$**

62) Is $\{(3,5), (4,6), (5,5), (6,6)\}$ a relation (function) or one to one function? Explain.

63) A ball is thrown straight up at an initial velocity of 54 feet per second. The height of the ball t seconds after it is thrown is given by the formula $h(t) = 54t - 16t^2$. Find the interval the ball is over 32 feet, to the nearest tenth. **.7 < x < 3.85 sec.**

64) Simplify and write without negative exponents: $\frac{(xy^{-3})^2}{x^4 y^{-2}} = \frac{1}{x^2 y^4}$

65) What is the common difference of the arithmetic sequence $-7x, -4x, -x, 2x, 5x, \dots$? **$d = 3x$**

66) Find the sum for the geometric series described as: $a_1 = 10, n = 6$, and $r = 4$ **$S_6 = 13650$**

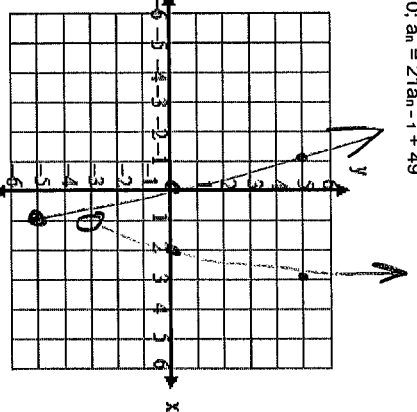
67) Solve the system of equations algebraically: $y = x - 4$
 $(x+2)^2 + y^2 = 4$ **$(4,0) (-2,-6)$**

68) Find the average rate of change over the interval for $-1 \leq x \leq 6$, for the following functions. Order from least to greatest.
 a) $f(x) = 7x + 1$ **7** b) $g(x) = x^3 - 4$ **3** | c) $h(x) = 4^x$ **585, 1**

69) Solve for x : $27^{6-x} = 9^{x-1}$
 $x = 4$

70) In 2014, the cost to mail a letter was 49¢ for up to one ounce. Every additional ounce cost 21¢. Which recursive function could be used to determine the cost of a 3-ounce letter, in cents?

71) Given the function $f(x) = \begin{cases} -5x, & x \leq 1 \\ x^2 - 4, & x > 1 \end{cases}$
 a) Algebraically, show how to find the y-intercept.
 b) Algebraically, solve each equation to prove/disprove if an x-intercept exists. **ANS.**
 c) Graph the function to provide graphically evidence for part a and part b.



72) a) Write the equation of the function that can represent the graph of the parabola in vertex form.

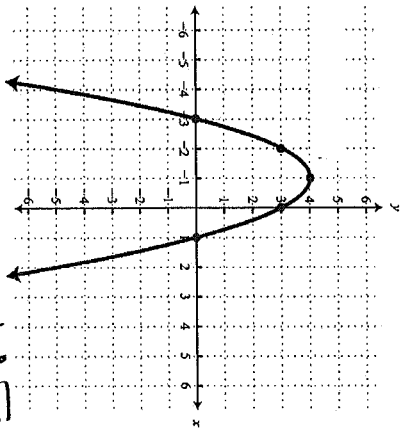
b) State the domain and range in interval notation.

c) Describe the end behavior.

d) State the roots of the graph.

e) State the y-intercept of the graph.

f) What is interval of decrease in set notation?



73) Solve the following equation in simplest a + bi form: $2x^2 = -2(3x + 6)$ **$x = -3 \pm i\sqrt{5}$**

74) Factor completely: $8x^3 + 4x^2 - 18x - 9$ **$(2x+3)(2x-3)(2x+1)$**

75) Simplify $xi(i-7)^2$, where i is the imaginary unit. **$48xi + 14x$**

$$31. (x-2)^2 + (y-3)^2 = 16 \quad x+y=1$$

$$\begin{array}{r} -x \\ -x \\ \hline y = 1-x \end{array}$$

$$(x-2)^2 + (1-x-3)^2 = 16$$

$$(x-2)^2 + (-2-x)^2 = 16$$

$$(x-2)(x-2) + (-2-x)(-2-x) = 16$$

$$\cancel{x^2} - \cancel{2x} - \cancel{2x} + 4 + 4 + \cancel{2x} + \cancel{2x} + \cancel{x^2} = 16$$

$$\begin{array}{r} 2x^2 + 8 = 16 \\ -16 \quad -16 \\ \hline 2x^2 - 8 = 0 \end{array}$$

$$2(x^2 - 4) = 0$$

$$2(x+2)(x-2) = 0$$

$$x = -2 \quad x = 2$$

$$x = -2 \quad x = 2$$

$$y = 1 - (-2) \quad y = 1 - 2$$

$$y = 3 \quad y = -1$$

$(-2, 3)$	$(2, -1)$
-----------	-----------

32. (2)
reflect
over y-axis
even

$$33. g(f(x))$$

$$\begin{array}{r} \leftarrow (3x+5) \\ g(3x+5) = (3x+5)^2 + 1 \\ = (3x+5)(3x+5) + 1 \\ = 9x^2 + 15x + 15x + 25 + 1 \\ = \boxed{9x^2 + 30x + 26} \end{array}$$

$$34. (3b)^{\frac{2}{d}}$$

$$\sqrt[2]{(3b)^2} (4)$$

$$35. \sum_{x=0}^{2 \text{ end}} (3-2a)^x = (3-2a)^0 + (3-2a)^1 + (3-2a)^2$$

$$= 1 + 3-2a + (3-2a)(3-2a)$$

$$= 4 - 2a + 9 - 6a - 6a + 4a^2$$

$$= \boxed{4a^2 - 14a + 13}$$

$x=0$
start

36. a. inc. $(-\infty, 0) \cup (2.5, \infty)$

b. $x \rightarrow -\infty, y \rightarrow -\infty$
 $x \rightarrow +\infty, y \rightarrow +\infty$

c. $(0, 6)$

d. $x = -1, 2, 3$

$$37. 6xi^3(-4xi+5)$$

$$\begin{array}{r} -24x^2i^4 + 30xi^3 \\ i^2 = -1 \\ -24x^2(i^2)^2 + 30xi^2 \cdot i \\ -24x^2(-1)^2 + 30x(-1) \cdot i \\ \boxed{-24x^2 - 30xi} \end{array}$$

$$38. 4x(x+2) = -7$$

$$4x^2 + 8x = -7$$

$$\begin{array}{r} +7 \\ +7 \\ \hline 4x^2 + 8x + 7 = 0 \end{array}$$

$$x = \frac{-8 \pm \sqrt{(8)^2 - 4(4)(7)}}{2(4)}$$

$$x = \frac{-8 \pm \sqrt{-48}}{8} = \frac{-8 \pm \sqrt{16 \cdot 3} \cdot i}{8}$$

$$x = \frac{-8 \pm 4i\sqrt{3}}{8}$$

$$\boxed{x = -1 \pm \frac{i\sqrt{3}}{2}}$$

39. (4)

40. $d=2$
 $a_1=5$

$$a_n = a_1 + (n-1)d$$

$$43 = 5 + (n-1)(2)$$

$$43 = 5 + 2n - 2$$

$$43 = 2n + 3$$

$$\begin{array}{r} 43 \\ -3 \\ \hline 40 = 2n \end{array}$$

$$\frac{40}{2} = \frac{2n}{2}$$

$$20 = n$$

$$\sum_{n=1}^{20} \text{explicit formula}$$

$$\sum_{n=1}^{20} 5 + (n-1)(2)$$

$$\sum_{n=1}^{20} 2n + 3$$

$$41. \begin{cases} 4x+4y+z=24 \\ 2x-4y+z=0 \\ 5x-4y-5z=12 \end{cases} \rightarrow \begin{cases} 2x-4y+z=0 \\ -2x+4y-2=0 \\ 5x-4y-5z=12 \end{cases}$$

$$6x + 2z = 24$$

$$-2x+4y-2=0$$

$$5x-4y-5z=12$$

$$3x - 6z = 12$$

$$3(6x+2z=24)$$

$$3x - 6z = 12$$

$$18x + 6z = 72$$

$$3x - 6z = 12$$

$$\frac{21x}{21} = \frac{84}{21}$$

$$x = 4$$

$$\begin{cases} 6(4)+2z=24 \\ 24+2z=24 \\ -24 \end{cases}$$

$$\frac{2z}{2} = \frac{0}{2}$$

$$z = 0$$

$$4(4)+4y+0=24$$

$$16+4y=24$$

$$-16 \quad -16$$

$$\frac{4y}{4} = \frac{8}{4}$$

$$y = 2$$

$$45. x^2+4x-5 < 0$$

$$(x+5)(x-1) < 0$$

$$x = -5 \quad x = 1$$

$$\leftarrow \text{Number Line} \rightarrow$$

$$\begin{array}{c} -5 \quad 1 \\ \hline -5 < x < 1 \end{array}$$

$$40. \begin{cases} (x+3)^2 + (y-3)^2 = 53 \\ x+y=5 \\ -x+y=-5 \end{cases}$$

$$y = 5-x$$

$$(x+3)^2 + (5-x-3)^2 = 53$$

$$(x+3)^2 + (2-x)^2 = 53$$

$$(x+3)(x+3) + (2-x)(2-x) = 53$$

$$x^2+3x+3x+9+4-2x-2x+x^2=53$$

$$2x^2+2x+13=53$$

$$-53 \quad -53$$

$$48. (f \circ g)(x)$$

$$g(x) = 3x-5$$

$$f(g(x)) = 3(3x-5)^2 + 4$$

$$3(9x^2 - 30x + 25) + 4$$

$$27x^2 - 90x + 75 + 4$$

$$27x^2 - 90x + 79$$

$$2x^2+2x-40=0$$

$$2(x^2+x-20)=0$$

$$2(x+5)(x-4)=0$$

$$x = -5 \quad x = 4$$

$$y = 5 - (-5) \quad y = 5 - 4$$

$$y = 10 \quad y = 1$$

$(-5, 10)$	$(4, 1)$
------------	----------

$$50. S_n = \frac{a_1 - a_1 r^n}{1-r} \quad \begin{matrix} r = -3 \\ a_1 = 5 \end{matrix}$$

$$S_7 = \frac{5 - 5(-3)^7}{1 - (-3)}$$

$$S_7 = 2735$$

$$42. \begin{cases} x + \sqrt{9-2x} = 3 \\ -x \end{cases}$$

$$\sqrt{9-2x} = 3-x$$

$$9-2x = (3-x)(3-x)$$

$$9-2x = 9-3x-3x+x^2$$

$$9-2x = x^2-6x+9$$

$$-9+2x \quad +2x \quad -9$$

$$0 = x^2-4x$$

$$0 = x(x-4)$$

$$x = 0 \quad x = 4$$

$$43. x^2 = 23-10x$$

$$+10x-23-23+10x$$

$$x^2+10x-23=0$$

$$x^2+10x+25-23-25=0$$

$$(x+5)(x+5)-48=0$$

$$(x+5)^2-48=0$$

$$+48 \quad +48$$

$$\sqrt{(x+5)^2} = \sqrt{48}$$

$$x+5 = \pm \sqrt{10 \cdot 3}$$

$$-5 \quad -5$$

$$x = -5 \pm 4\sqrt{3}$$

$$44. 2x^3+3x^2-8x-12$$

$$x^2(2x+3)-4(2x+3)$$

$$(x^2-4)(2x+3)$$

$$(x+2)(x-2)(2x+3)$$

$$47. f(x) = \frac{x^2-x}{3x^3+x}$$

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

$$= \frac{x^2+x}{-3x^3-x}$$

neither

graphically not reflect in y axis or origin

$$49. (x^{\frac{1}{2}} y^{-\frac{2}{3}})^{-6}$$

$$x^{-3} y^4 = \frac{y^4}{x^3}$$

$$51. \quad x^3 - 9x^2 - 5x + 45$$

$$x^2(x-9) - 5(x-9)$$

$$(x^2 - 5)(x-9)$$

$$54. \quad -10t^2 + 184t \geq 275$$

$$\frac{-184}{-20} \quad \frac{-275}{-20}$$

$$-10t^2 + 184t - 275 \geq 0 \quad \text{quad form.}$$

$$X = \frac{-184 \pm \sqrt{(184)^2 - 4(-10)(-275)}}{2(-10)}$$

$$X = \frac{-184 \pm \sqrt{10756}}{-20} \quad \text{or}$$

$$y_1 = -10x^2 + 184x$$

$$y_2 = 275$$

int.

$$1.8 \leq x \leq 9.7 \text{ sec.}$$

58. a. reflect over x axis,
vertical stretch of 2,
left 5, down 2

b. domain: $-7 \leq x \leq 3$

range: $4 \leq y \leq 21$ reflect

$-4 \geq y \geq -21$ (2)

$-8 \geq y \geq -42$ (2)

$-10 \geq y \geq -44$

$$52. \quad (x-5)^2 + 2(x-5) - 8$$

$$y = x-5 \rightarrow y^2 + 2y - 8$$

$$(y+4)(y-2)$$

$$(x-5+4)(x-5-2)$$

$$(x-1)(x-7)$$

$$55. \quad \frac{x^5 y^{-4}}{x^{-3} y^{-2}} = x^{8-2} y^{-2} = \frac{x^8}{y^2}$$

$$57. \quad \frac{12(y+3)}{12} = \frac{(x-3)^2}{12}$$

$$y+3 = \frac{1}{12}(x-3)^2$$

$$y = \frac{1}{12}(x-3)^2 - 3$$

$$V: (3, -3) \quad F: (3, 0)$$

$$p = 3$$

$$60. \quad \sum_{n=1}^3 (n^2 - nx + 2)$$

$$(1^2 - 1x + 2) + (2^2 - 2x + 2) + (3^2 - 3x + 2)$$

$$1 - 1x + 2 + 4 - 2x + 2 + 9 - 3x + 2$$

$$= -6x + 18$$

$$53. \quad (2, 7)$$

$$(3, 1)$$

$$(5, 4)$$

$$(1, 9)$$

one to one
x and y
are different

$$56. \quad \text{geo } r = -4, a_1 = 3$$

$$S_n = \frac{a_1 - a_1 r^n}{1 - r}$$

$$S_8 = \frac{3 - 3(-4)^8}{1 + 4}$$

$$S_8 = -39321$$

$$59. \quad 5^{5x+1} = (5^2)^{x+2}$$

$$\frac{5x+1}{-2x} = \frac{2x+4}{-2x}$$

$$3x+1 = 4$$

$$\frac{3x}{3} = \frac{3}{3}$$

$$x = 1$$

61. $x^3 - 8x^2 - 4x + 32$
 $x^2(x-8) - 4(x-8)$
 $(x^2-4)(x-8)$
 $(x+2)(x-2)(x-8)$

62. (3,5) only X's
 (4,6) different
 (5,5) function
 (6,6)

63. $54x - 12x^2 = 32$ or quad.
 $y_1 = 54x - 12x^2$ formula
 $y_2 = 32$
 int.
 $x = .7, 3.8$ sec.

64. $\frac{(x^4 y^{-3})^2}{x^4 y^{-2}} = \frac{x^8 y^{-6}}{x^4 y^{-2}} = x^4 y^{-4} = \frac{1}{x^2 y^4}$
 15. $k = 3x$

$.7 < x < 3.8$ sec.

66. $S_n = \frac{a_1 - a_1 r^n}{1-r}$
 $S_6 = \frac{10 - 10(4)^6}{1-4}$
 $S_6 = 13650$

67. $(x+2)^2 + y^2 = 4$ $y = x-4$
 $(x+2)(x+2) + (x-4)^2 = 4$
 $x^2 + 2x + 2x + 4 + (x-4)(x-4) = 4$
 $x^2 + 4x + 4 + x^2 - 4x - 4x + 16 = 4$
 $2x^2 - 4x + 20 = 4$
 $2x^2 - 4x + 16 = 0$
 $2(x^2 - 2x + 8) = 0$
 $2(x-4)(x+2) = 0$
 $x=4$ $x=-2$
 $y=4-4$ $y=-2-4$
 $y=0$ $y=-6$

(4,0)	(-2,-6)
-------	---------

68. a. $(-1, -6)$ $m = \frac{43+6}{6+1} = \frac{49}{7} = 7$
 $(6, 43)$

b. $(-1, -5)$ $m = \frac{217+5}{6+1} = \frac{222}{7} = 31$
 $(6, 217)$

c. $(-1, .25)$ $m = \frac{4096+.25}{6+1} = \frac{4096.25}{7} = 585.1$
 $(6, 4096)$
 (a, b, c)
 $\frac{10383}{28}$

71. a. yint. $x=0$
 vs $-\frac{5x}{-5} = \frac{0}{-5}$
 $x=0$

b. xint. $y=0$
 $0 = -\frac{5x}{-5}$ $0 = x^2 - 4$
 $0 = (x+2)(x-2)$
 $x = -2$ $x = 2$

c. on graph

69. $(3^3)^{6-x} = (3^2)^{x-1}$
 $18 - 3x = 2x - 2$
 $+3x +3x$
 $18 = 5x - 2$
 $+2 +2$
 $20 = 5x$
 $\frac{20}{5} = \frac{5x}{5}$
 $4 = x$

70. (1)

72. a. $y = -(x+1)^2 + 4$
 b. domain: $(-\infty, \infty)$
 range: $(-\infty, 4]$

c. $x \rightarrow -\infty, y \rightarrow -\infty$
 $x \rightarrow +\infty, y \rightarrow -\infty$

d. $x = -3, 1$

e. $(0, 3)$

f. $x > -1$

73. $2x^2 = -2(3x+6)$
 $2x^2 = -6x - 12$
 $+6x + 12 +6x + 12$
 $2x^2 + 6x + 12 = 0$ quad formula
 $x = \frac{-6 \pm \sqrt{(6)^2 - 4(2)(12)}}{2(2)}$

$x = \frac{-6 \pm \sqrt{-60}}{4}$

$x = \frac{-6 \pm \sqrt{4 \cdot 15} \cdot (-1)}{4}$

$x = \frac{-6 \pm 2i\sqrt{15}}{4}$

$x = \frac{-3 \pm i\sqrt{15}}{2}$

74. $8x^3 + 4x^2 - 18x - 9$
 $4x^2(2x+1) - 9(2x+1)$
 $(4x^2-9)(2x+1)$
 $(2x+3)(2x-3)(2x+1)$

75. $xi(i-7)(i-7)$
 $xi(i^2-7i-7i+49)$
 $xi(i^2-14i+49)$
 $xi^3 - 14xi^2 + 49xi$
 $x(i^2) \cdot i - 14x(-1) + 49xi$
 $-xi + 14x + 49xi = 48xi + 14x$