_____ Name Garrett Reed _____ Date 1/25 Hr 3 Calc # 417

Row =

FAT (A) TEST 2 v1

Show all possible work!

5 0–1.2 Find the intersection of the two sets.

1) {1, 3, 4, 9} ∩ {4, 11, 1}

{1, 4}

5 0–1.3 Find the union of the two sets.

2) {2, 7, 5, 9} ∪ {5, 6, 2}

{2, 5, 6, 7,

5 0–2.2 Simplify the exponential expression.

3) $\left(\frac{xy^6}{x^6y}\right)^{-2}$ $\frac{x^{-2}y^{-12}}{x^{-12}y^{-2}} = {}^{8}y^{-10} = \frac{x^{8}}{y^{10}}$

${}^{0}y^{-10} = \boxed{\frac{x^{10}}{y^{10}}}$

2 0–3.6 Rationalize the denominator.

4) $\frac{7}{8 - \sqrt{5}} \cdot \frac{(8+\sqrt{5})}{8+\sqrt{5}} = \frac{56}{6} \frac{7\sqrt{5}}{+5} = \frac{56+7\sqrt{5}}{69}$

$\frac{56}{6} \frac{7\sqrt{5}}{-5} = \frac{56+7\sqrt{5}}{59}$

0 0–5.3 Factor the trinomial, or state that the trinomial is prime.

5) $20x^2 + 23x + 6$

$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$ $-23 \pm \sqrt{23^2-4(20)(6)}$

$\frac{-23 \pm}{2} \frac{\sqrt{1009}}{}$ $\frac{-2}{} \frac{\sqrt{1009}}{10}$ $\frac{-23}{40} + \frac{\sqrt{1009}}{40}$

$\frac{-2 \pm \sqrt{49}}{10} = \frac{-23 \pm 7}{40}$ $-\frac{2}{5}$ $-\frac{3}{4}$

$(\quad +3)(5x+2)$

5 0–5.4 Factor the difference of two squares.

6) $25x^2 - 49$

$(5x+7)(5x-7)$

0 0–5.5 Factor the perfect square trinomial.

7) $100x^2 - 20x + 1$

$(50x-1)(50x+1)$

$(10x-1)(10x-1)$

FAT (A) TEST 2 v1

☆ 4 0-5.6 **Factor using the formula for the sum or difference of two cubes.**

8) $64x^3 - 27$ $(4x-3)(\ 9x^2 + 12x + 9)$

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-12 \pm \sqrt{12^2 - \ldots}}{2(\ldots)}$ 2(a)

$x = 0, \frac{-12}{3x}$ $\frac{\sqrt{432}}{32}$ $\frac{2 \pm \sqrt{-432}}{32} = \frac{-12 \pm \sqrt{432}\,i}{32} = \frac{3}{2} \pm \frac{\sqrt{432}}{32i}$

4 0-7.12 **Solve the radical equation, and check all proposed solutions.**

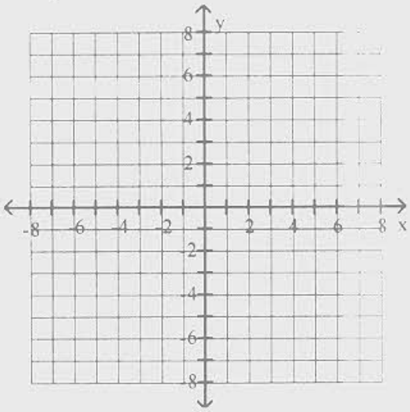
9) $\sqrt{4x + 45} = x$

$4x + 45 = x^2$
$-4x \quad -4x$
$45 = x^2 - 4x$
-45
$0 = x^2 - 4x - 45$

$\frac{b \pm \sqrt{b^2 - 4ac}}{2a}$
$\frac{4 \pm \sqrt{4^2 - 4(1)(-45)}}{2(1)}$
$\frac{4 \pm \sqrt{196}}{2} = \frac{4 \pm 14}{2} = 9, -5$ Extra

h 1-1.2 **Write the English sentence as an equation in two variables. Then graph the equation.**

10) The y-value is seven decreased by the square of the x-value.



5 1-1.3 **Use the table feature of your graphing calculator to answer the following question about**

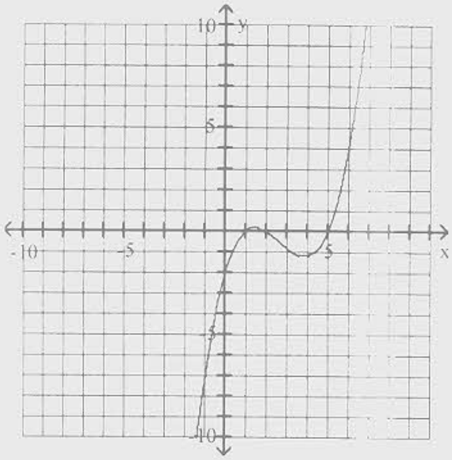
$$y_1 = x - 3$$
$$y_2 = x^2 - 2x - 3$$

11) a) Does the graph of Y_2 pass through the origin? No

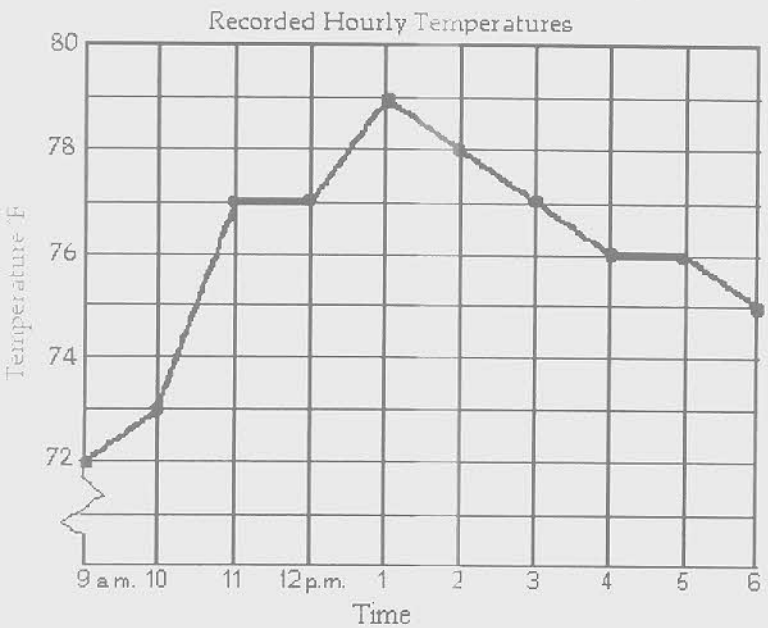
b) At which points do the graph of Y_1 and Y_2 intersect? (0, -3) (3, 0)

F
1-1.4 Use the graph to determine the x- and y-intercepts.

12)



F
1-1.5 The line graph shows the recorded hourly temperatures in degrees Fahrenheit at an airport.



13) a) At what time was the temperature the highest?

b) During which two hour period did the temperature increase the most?

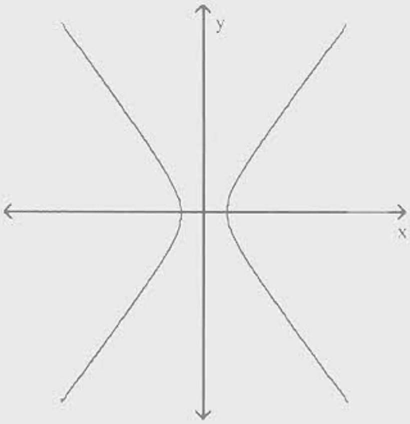
5
1-2.3 Determine whether the equation defines y as a function of x.

14) a) $x + y^2 = 49$ b) $y = \sqrt{2x + 4}$

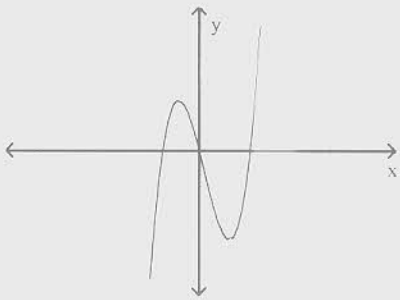
FAT (A) TEST 2 v1

5 ____ 1-2.6 **Use the vertical line test to determine whether or not each graph is a graph in which y is a function of x.**

15) a.

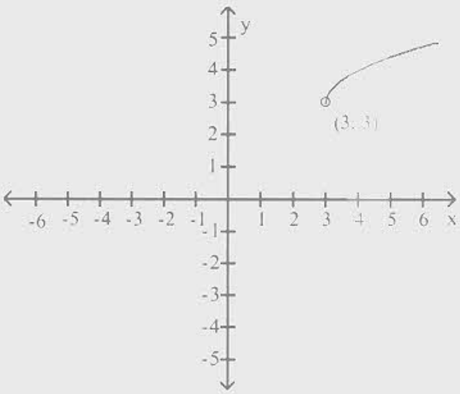


b.



5 ____ 1-2.8 **Use the graph to determine the function's domain and range.**

16)



5 ____ 1-3.1 **a) Find and simplify the difference quotient** $\frac{f(x+h)-f(x)}{h}$**,** $h \neq 0$ **for the given function.**

b) Find $\text{Lim}_{h \to 0} =$ ____________

17) $f(x) = 4x^2 + 2x$

5 1-3.2 **Piecewise Functions.**

18)

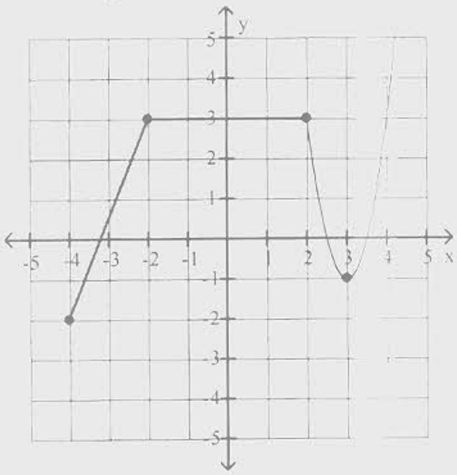
Suppose a life insurance policy costs \$32 for the first five units of coverage and then \$8 for each additional unit of coverage. Let C(x) be the cost for insurance of x units of coverage.

a) Write a piecewise function for this situation.

b) What will 10 units of coverage cost?

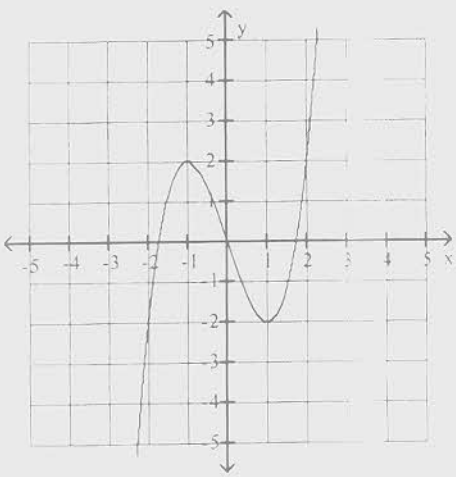
5 1-3.3 **Identify the intervals where the function is changing as requested.**

19) Increasing ______________ Decreasing, ______________ and Constant ______________



5 1-3.4 **Use the graph of the given function to find any relative maxima and relative minima.**

20)



FAT (A) TEST 2 v1

5 1-3.5 Determine whether the given function is even, odd, or neither.

21) a) $f(x) = x^3 - 4x$

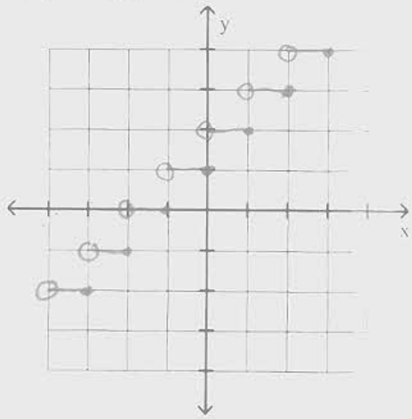
odd

b) $f(x) = 4x^2 + x^4$

even

0 1-3.6 a) Graph the function under the Domain [-5, 5].
b) What is the corresponding range?

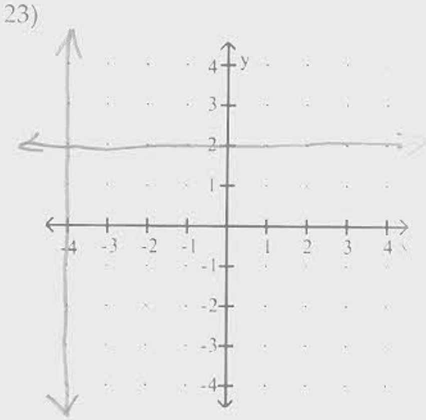
22) $f(x) = \text{int}(x) + 1$



2(x+1)

5 1-4.4 a) Graph the vertical, and horizontal lines through the point (–4, 2) in the rectangular coordinate system.
b) Write the equations of the lines.

23)



x=-4
y=2

5 1-4.7 **Model with linear function.**

24) When making a telephone call using a calling card, a call lasting 3 minutes cost \$1.20. A call lasting 11 minutes cost \$3.20. Let y be the cost of making a call lasting x minutes using a calling card.

a) Write a linear equation that models the cost of a making a call lasting x minutes.

b) Find the cost for a 2 hour phone call.

5 1-5.1 **Use the given conditions to write an equation for the line in the indicated form.**

25) Passing through (5, 3) and perpendicular to the line whose equation is $y = \frac{1}{9}x + 5$;

in slope-intercept form

$y - = m(x - x_1)$

$y - = -9(x-5)$

$y - = -9x + 45$

$+3$

$= -9x + 48$

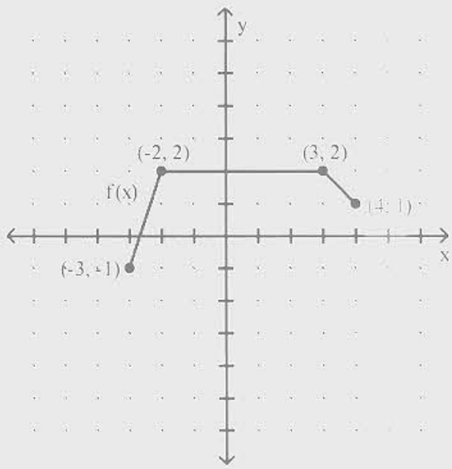
5 1-5.3 **Solve the problem.**

26) Along with incomes, people's charitable contributions have steadily increased over the past few years. The table below shows the average deduction for charitable contributions reported on individual income tax returns for the period 1993 to 1998. Find the average annual increase between 1995 and 1997.

Year	Charitable Contributions
1993	\$1770
1994	\$2410
1995	\$2470
1996	\$2850
1997	\$3080
1998	\$3120

5 1-6.7 **Graph g(x) as transformations of f(x). Make a list of tables naming each transfomration.**

27) $g(x) = -2f(2x + 4) - 1$



5 **1-7.2 Solve the problem.**

28) A firm is considering a new product. The accounting department estimates that the total cost, C(x), of producing x units will be

$C(x) = 85x + 4760.$

The sales department estimates that the revenue, R(x), from selling x units will be

$R(x) = 95x,$

but that no more than 665 units can be sold at that price.

Find and interpret (R – C)(665). $95(665) - [85(665) + 760] = \$1890$ revenue - 665 units

5 **1-7.4 a) Find the composite (f(g(x))**
b) and find the domain of f(g(x))

29) $f(x) = \frac{5}{x + 6}$, $g(x) = \frac{30}{x}$

$$\frac{5}{\frac{30}{x}+6} = \frac{5}{\frac{30}{x}+\frac{6x}{x}} = \frac{5}{\frac{30+6x}{x}} \cdot \frac{x}{1} = \frac{5}{30+6x}$$

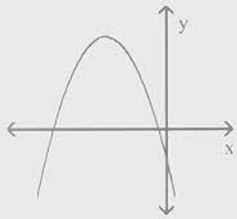
$D\{x \mid x \neq 0, -5\}$

5 **1-7.5 Find functions f and g so that h(x) = (f g(x)).**

30) $h(x) = \sqrt{12x^2 + 76}$

5 1-8.3 **Does the graph represent a function that has an inverse function?**

31)



5 1-8.5 **A) Algebraically find the inverse for the given function.**

B) Graph f as a solid line and f^{-1} as a dashed line in the same rectangular coordinate space.

C) Use interval notation to give the domain and range of f and f^{-1}.

32) $f(x) = (x - 4)^2, x \geq 4$ D:[4,) R:[0,∞)

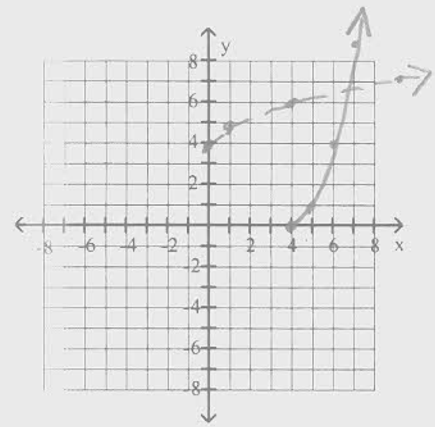
$\sqrt{x} = \sqrt{(y-4)^2}$

$\sqrt{x} = y - 4$

+4

$\sqrt{x} + 4 = y$

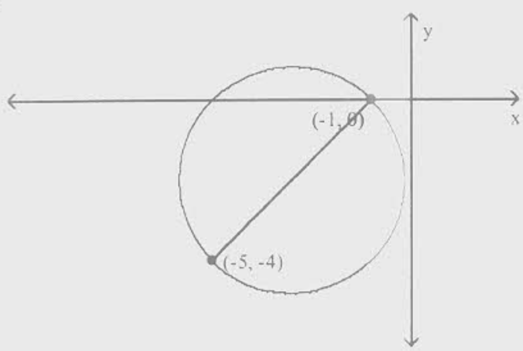
D:[0,∞) R:[4,∞)



5 1-9.3 **Find the center and radius for the circle.**

Write the standard form of the equation of the circle with the given center and radius.

33)



$C = \left(\frac{-5+-1}{2}, \frac{-4}{2}\right) = (-3, -2)$

$R = \sqrt{(-3-5)^2 + (-2-4)^2} = \sqrt{8}$

$(x+3)^2 + (y\ \ )^2 = 8$

5 1-9.5 **A) Complete the square and write the equation in standard form.**

B) Then give the center and radius of the circle.

34) $x^2 + y^2 + 4x + 18y = -49$

$(x^2+4x+4)(y^2+18y+\ \ ) = -49+4+81$

$(x+2)^2(y+9)^2\ \ 36$

$C(-2,-9)$ $= \sqrt{36} = 6$

Garrett Reed 1/26 3 41?

FA[illegible] A) TEST 2 v1

5 [illegible]-9.5 A) Complete the square and write the equation in standard form.
B)Then give the center and radius of the circle.

[illegible]4) $x^2 + y^2 + 4x + 18y = -49$

$(x^2+4x+4)(y^2+18y+ \quad = -49+4+81$

$(x+2)^2(y+9)^2 =$

$C(-2,-9) \quad r: \sqrt{36} = 6$

5 [illegible]-1.1 Add or subtract as indicated and write the result in standard form.

[illegible]5) $(9 + 6i) - (-3 + i)$

$12+5i$

5 2-1.3 Divide and express the result in standard form.

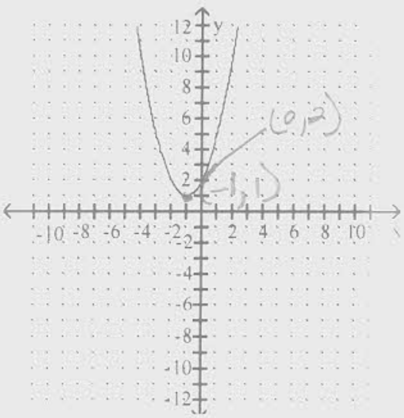
[illegible]6) $\frac{9 + 2i}{4 - 3i} \cdot \frac{(4+3i)}{4+3i} = \frac{36+2}{16} \quad \frac{+8i+6i^2}{i^2} = \frac{30+35i}{25} \quad \frac{6}{5} + \frac{7}{5}i$

5 [illegible]-1.5 Solve the quadratic equation using the quadratic formula. Express the solution in standard form.

[illegible]7) $x^2 - 12x + 40 = 0 \quad \frac{-b \pm \sqrt{b^2}}{2a} \quad \frac{2c}{} = \frac{12 \pm \sqrt{(-12)^2 - 4(1)(40)}}{2(1)} = \frac{12 \pm \sqrt{-16}}{2} = \frac{12 \pm 4i}{2} = 6 \pm 2i$

4 [illegible]-2.1 The graph of a quadratic function is given. Determine the function's equation.

[illegible]3)



$y = a(x-h)^2 + k \qquad y = 3(x+1)^2 + 1$

$2 = a(0-(-1))^2 +$

$2 = 1a + 1$

$-1 \qquad -1$

$3 = a$

$\boxed{\begin{array}{l} 2 = 1a+1 \\ -1 \qquad -1 \\ 1 = a \end{array}}$

FAT (A) TEST 2 v1

4 2-2.3 **Using quadratics to determine minimum or maximum.**

39) On a certain route, an airline carries 8000 passengers per month, each paying \$80. A market survey indicates that for each \$1 decrease in the ticket price, the airline will gain 40 passengers.

a. Express the monthly revenue for the route, R, as a function of the ticket price, x.

$R(x) = x(8000+40(80-x))$
$x(800+3200-40x)$
$11{,}200x - 40x^2$
$-40x^2 + 11{,}200x$

$R(x) \quad x(8000+40(80-x))$
$x(8000+32000-40x)$
$40{,}000x - 40x^2 = -40x \quad 40{,}000x$

b. Find the ticket price that will maximize the revenue, and find the maximum revenue.

$\frac{-b}{2a} = \frac{-40{,}000}{2(-40)} = \$500$ $R(500) = -40(500)^2 + 40{,}000(500)$

$R(500) = \$10{,}000{,}000$ max revenue w/ a price of \$500

$\frac{-b}{2a} = \frac{-11{,}200}{2(-40)} = \$140$ $R(140) = -40(140)^2 + 11{,}200(140)$

$R(140) = \$784{,}000$ max revenue w/ a price of \$140

0 2-2.4 **Using quadratics to solve.**

40) A person standing close to the edge on top of a 224-foot building throws a baseball vertically upward. The quadratic function $s(t) = -16t^2 + 64t + 224$ models the ball's height above the ground, s(t), in feet, t seconds after it was thrown. After how **many** seconds does the ball **hit the ground**? Round to the nearest tenth of a second if necessary.

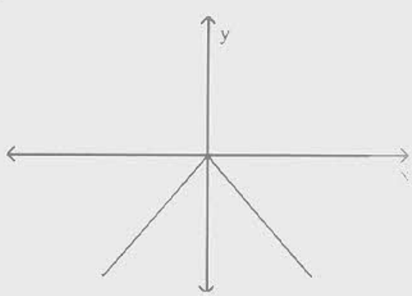
$0 = -16t^2 + 64t + 224 \quad \frac{-b}{2a}$ $\frac{-64}{2(-16)}$ 2secs $0 \quad -16t^2+64t+224$

$(-4x \quad)(4x$

Vertex?

5 2-3.1 **Determine whether the graph shown is the graph of a polynomial function.**

41)



Not a polynomial function

5 2-3.3 **Use the Leading Coefficient Test to determine the end behavior of the polynomial function.**

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

up to the left + down to the right

$\underline{\ \ t\ \ }$ 3.4 Find the zeros of the polynomial function. (Factor by grouping to solve.)

3) $f(x) = x^3 + 8x^2 - x - 8$

$(x^3+8x^2)+(-x-8)$

$x^2(x+8)-1(x+8)$

$(x+8)(x^2-1)$

$\to (x+8)(x-1)(x+1)$

Zeros: $x = -8, 1, -1$

$\underline{\ 5\ }$ 3.5 a) Find the zeros for the polynomial function and give the multiplicity for each zero.
b) State whether the graph crosses the x-axis or touches the x-axis and turns around, at each zero.

4) $f(x) = \left(x + \frac{1}{4}\right)^2(x - 5)^5$

X: 1/4 ; 2 ; touch a turn

X: 5 ; 5 ; cross

$\underline{\ 5\ }$ 3.6 Use the Intermediate Value Theorem to determine whether the polynomial function has a real zero between the given integers.

5) $f(x) = 8x^5 - 5x^3 + 5x^2 + 8$; between -2 and -1

$f(-2) = -188$

$f(-1) = 16$

yes at least one zero be een -2 & -1

$\underline{\ 3\ }$ 4.1 Divide using long division.

6) $(-3x^5 - x^3 - 2x^2 + 158x + 14) \div (x^2 - 7)$

$-3x^3+20x-2 \quad \frac{298}{x^2-7}$

$x^2-7 \overline{) -3x^5+0x^4-x^3-2x^2+158x+14}$

$-(-3x^5 \quad +21x^3)$

$20x^3 \quad 2x^2+158x$

$-(20x^3 \quad -140x)$

$2x^2+298x+14$

$-\ 2x^2 \quad +14)$

$298x$

$3x^3-22x-2+\frac{4x}{x^2-7}$

$x^2-7 \overline{) 3x^5+0x^4-x^3-2x^2+158x+14}$

$-(3x^5 \quad +21x^3)$

$-22x^3-2x^2+158x$

$-(-22x^3 \quad +154x)$

$-2x^2+4x+14$

$-(-2x^2 \quad +14)$

$4x$

5 2-4.2 Divide using synthetic division.

47) $\frac{6x^3 + 14x^2 + 3x - 2}{x + 2}$

$$\begin{array}{r|rrrr} -2 & 0 & 14 & 3 & -2 \\ & & -12 & -4 & 2 \\ \hline & 6 & 2 & -1 & \boxed{0} \end{array}$$

$6x^2 + 2x - 1$

5 2-5.1 Use Descartes's Rule of Signs to determine the possible number of positive and negative real zeros for the given function.

48) $f(x) = 3x^4 - 16x^3 + 56x^2 - 56x + 13$

Possible Positive + − + − + 4, 2, 0

Possible Negative + + + − + 0

5 2-5.2 Use the Rational Zero Theorem to list all possible rational zeros for the given function.

49) $f(x) = 3x^4 - 16x^3 + 56x^2 - 56x + 13$

$\frac{P}{q} = \frac{1, 13}{1, 3} = \pm 1, \frac{1}{3}, \pm 13, \pm \frac{13}{3}$

5 2-5.3 Find a rational zero of the polynomial function and use it to find all the zeros of the function using synthetic devision.

50) $f(x) = 3x^4 - 16x^3 + 56x^2 - 56x + 13$ zeros: $x = \frac{1}{3}, 1, 2+3i, 2-3i$

$$\begin{array}{r|rrrrr} \frac{1}{3} & 3 & -16 & 56 & 56 & 13 \\ & & 1 & -5 & 17 & -13 \\ \hline 1 & 3 & -15 & 51 & -39 & \boxed{0} \\ & & 3 & -12 & 39 & \\ \hline & 3 & -12 & 39 & \boxed{0} & \end{array}$$

$3x^2 - 12x + 39$

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{12 \pm \sqrt{(-12)^2 - 4(3)(39)}}{2(3)}$

$\frac{12 \pm \sqrt{-324}}{6} = \frac{12 \pm 18i}{6} = 2 \pm 3i$

5

-5.4 **Find an nth degree polynomial function with real coefficients satisfying the given conditions.**

1) n = 3; -1 and -2 + 3i are zeros; leading coefficient is 1

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

$((x+2)^2-9i^2)$

$(x^2+4x+4+9)$

$(x+1)(x^2+4x+13)$

x^3+4x^2+x

x^2+x+13

$y=x^3+5x^2+x+13$

6

-5.5 **Solve the polynomial equation.**

2) $0 = x^3 + 64$

$(x+4)(x^2-4x+16)$

$\frac{-4\pm\sqrt{4^2-4(1)(16)}}{2} = \frac{-4\pm\sqrt{-48}}{2}$

$\frac{-4\pm\sqrt{48}i}{2} = -2\pm\sqrt{48}i$

$x=-4, -2+\frac{\sqrt{48}}{2}i, -\frac{\sqrt{48}}{2}i$

-6.1 **Find the domain of the rational function.**

3) $f(x) = \frac{x^2 - 4x + 3}{x^2 - 2x - 3}$

D: {x | ≠ ~~0~~, 3}

$\boxed{D: \{x \mid \neq -1, 3\}}$

7

-6.2 **Find the vertical asymptotes, and holes, if any, of the graph of the rational function.**

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

VA = -1

Hole (3, ~~0~~) [, .5)

5

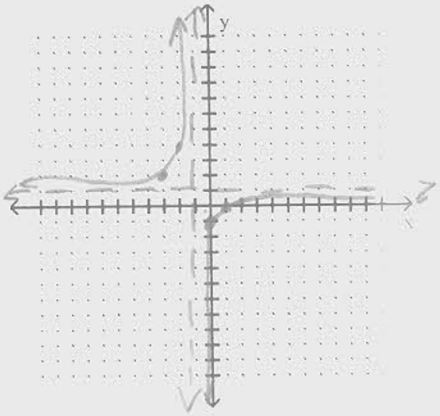
-6.3 **Find the horizontal asymptote, if any, of the graph of the rational function.**

5) $f(x) = \frac{x^2 - 4x + 3}{x^2 - 2x - 3}$ HA = y = 1

FAT (A) TEST 2 v1

4 ___ 2-6.4 Graph the rational function. Include all asymptotes, holes, and important points. Find the range of the function.

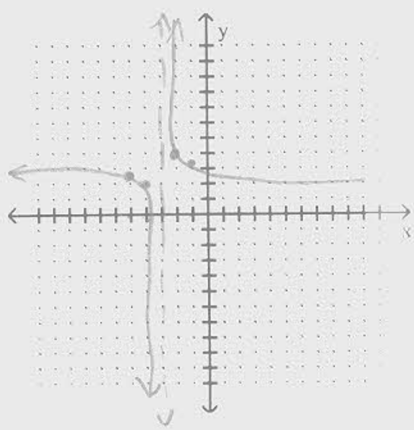
56) $f(x) = \dfrac{x^2 - 4x + 3}{x^2 - 2x - 3}$



R{y|y≠1, -1}

5 ___ 2-6.5 Use transformations of $f(x) = \dfrac{1}{x}$ or $f(x) = \dfrac{1}{x^2}$ to graph the rational function. Make a table list of trans.

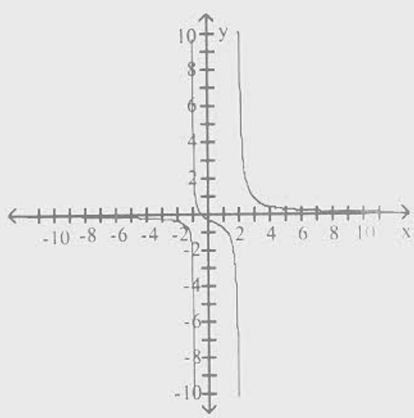
57) $f(x) = \dfrac{1}{x+3} + 3$



Parent x	Parent y	Lf 3 x	Lf 3 y	↑3 y
-2	-.5	-5	-.5	2.5
-1	-1	-4	-1	2
0	U	-3	U	U
1	1	-2	1	4
2	.5	-1	.5	3.5

5 ___ 2-6.7 Use the graph of the rational function shown to complete the statement.

58)



As $x \to 2^-$, $f(x) \to$? $-\infty$

As $x \to 2^+$, $f(x) \to \infty$

5

6.8 Using rational functions to solve.

1) A drug is injected into a patient and the concentration of the drug is monitored. The drug's concentration, C(t), in milligrams after t hours is modeled by

$$C(t) = \frac{8t}{3t^2 + 2}.$$

What is the horizontal asymptote for this function?

$y = 0$

Describe what this means in practical terms.

as the hours i creases the drug approc zero

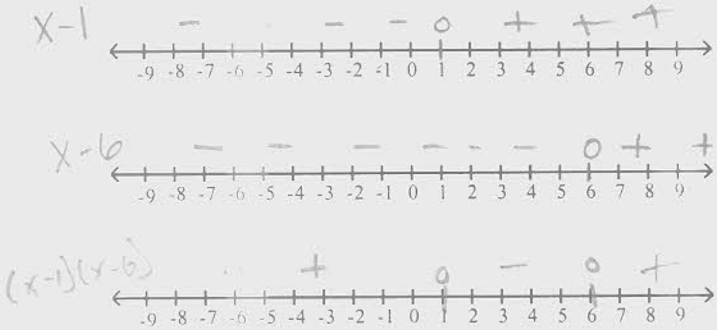
5

7.1 Solve the polynomial inequality using sign pattern analysis and express the solution set in interval notation.

1) $x^2 - 7x + 6 > 0$

$(x-1)(x-6) > 0$

$(-\infty, 1) \cup (6, \infty)$

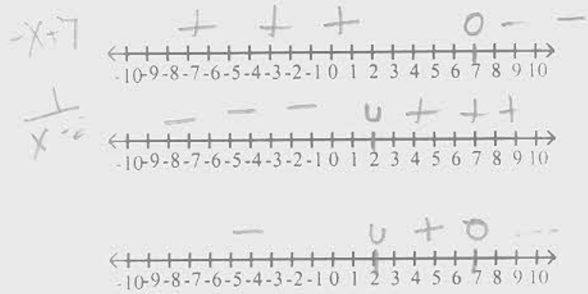


5

7.2 Solve the rational inequality using sign patterns and express the solution set in interval notation.

1) $\dfrac{-x + 7}{x - 2} \geq 0$

$(-2, 7]$



5

7.3 Solve the problem.

2) A ball is thrown vertically upward with an initial velocity of 96 feet per second. The distance in feet of the ball from the ground after t seconds is $s = 96t - 16t^2$. For what interval of time is the ball more than 128 above the ground?

$9\ \ -16t^2 > 128$

$-1\ \ ^2 + 96t - 128 > 0$

$-1\ \ t^2 - 6t + 8) > 0$

$-1\ \ t-2)(t-4) > 0$

ween 2 & 4 secs

FAT (A) TEST 2 v1

5 2-7.4 **Solve the rational inequality.**

63) You drive 90 miles along a scenic highway and then take a 35-mile bike ride. Your driving rate is 3 times y cycling rate. Suppose you have no more than a total of 7 hours for driving and cycling. Let x represent you cycling rate in miles per hour. Use a rational inequality to determine the possible values of x.

$$\frac{90}{3x} + \frac{35}{x} \le 7 \qquad \frac{65}{x} \le 7x$$

Cycle te at least 9.3 mph

$$\frac{30}{x} + \frac{35}{x} \le 7 \qquad \frac{65 \le 7x}{7}$$

$$9.3 \le x$$

5 2-8.1 **Solve the dircect variation.**

64) The amount of gas that a helicopter uses is directly proportional to the number of hours spent flying. The helicopter flies for 3 hours and uses 39 gallons of fuel. Find the number of gallons of fuel that the helicopte es to fly for 4 hours.

$$g = Kh \qquad g = 13$$

$$\frac{39 = K(3)}{3} \qquad g = 13$$

$$13 = K \qquad g = 5 \text{ gals}$$

5 2-8.2 **Solve inverse variation.**

65) When the temperature stays the same, the volume of a gas is inversely proportional to the pressure of the If a balloon is filled with 245 cubic inches of a gas at a pressure of 14 pounds per square inch, find the new pressure of the gas if the volume is decreased to 35 cubic inches.

$$V = K/p \qquad 3430/p$$

$$(245)14 = K/245\,(245) \qquad 5 = 3430/p\,(p)$$

$$3430 = K \qquad \frac{p = 3430}{35}$$

$$p = 98\text{psi}$$

5 2-8.3 **Write an equation that expresses the relationship. Use k for the constant of proportionality.**

66) s varies directly as t and inversely as u.

$$s = kt/u$$