Pre-Calculus
Chapter 2 Practice Test 2018

Name Hawl

Use the vertex and intercepts to sketch the graph of the quadratic function.

1) $f(x) = x^2 + 6x + 8$ Find the vertex, and x- and y-intercapts.

$x = \frac{-6}{2(1)} = -3$

$f(-3) = (-3)^2 + 6(-3) + 8$
$= 9 - 18 + 8$
$= -1$

x-int
$0 = x^2 + 6x + 8$
$0 = (x+4)(x+2)$
$x = -4, -2$

y-int
$y = 0^2 + 6(0) + 8$

1) V: $(-3, -1)$
x-int $= -4, -2$
y-int $= 8$

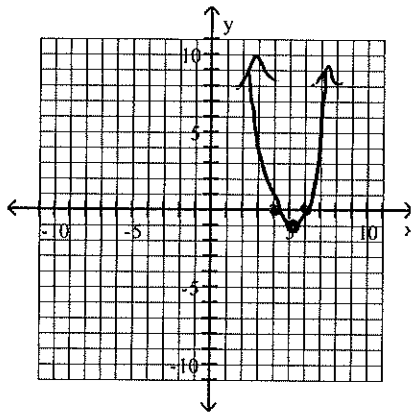
2) $y + 1 = (x - 5)^2$

$y = (x-5)^2 - 1$
V: $(5, -1)$

y-int
$y = (0-5)^2 - 1$
$y = 25 - 1$
$y = 24$

x-int $= 0 = (x-5)^2 - 1$
$\sqrt{1} = \sqrt{(x-5)^2}$
$\pm 1 = x - 5$
$x = 5 \pm 1$
$x = 6, 4$

2) _____



3) $f(x) = -2x^2 + 16x - 33$

$x = \frac{-16}{2(-2)} = \frac{-16}{-4} = 4$

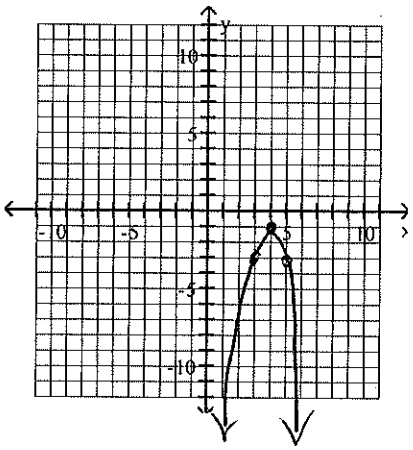
$f(4) = -2(4)^2 + 16(4) - 33$
$= -2(16) + 16(4) - 33 = -1$

V: $(4, -1)$

y-int
$y = -2(0)^2 + 16(0) - 33$
$y = -33$

x-int
None

3) _____



x	y
3	$-2(3)^2 + 16(3) - 33$
	$= -3$

4) $(-5x^5 - x^3 - 4x^2 + 138x + 20) \div (x^2 - 5)$ 4) _____

$$x^2-5\overline{)-5x^5-x^3-4x^2+138x+20}$$

$$-5x^3+24x+116+\frac{138x+600}{x^2-5}$$

$$+5x^5 \quad +25x^3$$

$$24x^3-4x^2+138x+20$$

$$-24x^3-120x^2$$

$$-116x^2+138x+20$$

$$+116x^2 \quad +580$$

$$138x+600$$

↓ Below

Solve the problem.

5) The manufacturer of a CD player has found that the revenue R (in dollars) is $R(p) = -5p^2 + 1040p$, when the unit price is p dollars. If the manufacturer sets the price p to maximize revenue, what is the maximum revenue to the nearest whole dollar? 5) _____

$$x = \frac{-b}{2a} = \frac{-1040}{2(-5)} = \frac{-1040}{-10} = 104$$

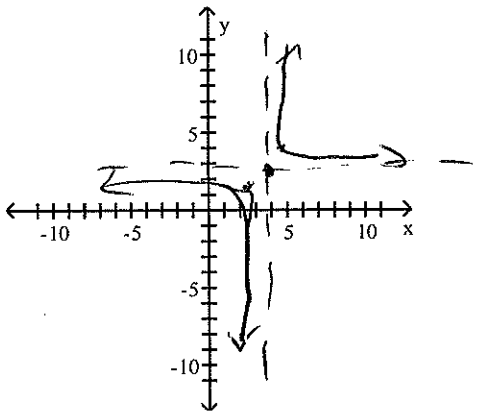
$$y = -5(104)^2 + 1040(104)$$

$$\boxed{y = 54080}$$

Use transformations of $f(x) = \frac{1}{x}$ or $f(x) = \frac{1}{x^2}$ to graph the rational function.

6) $f(x) = \frac{1}{x-4} + 3$ 6) _____

Center (4, 3)



$$-5x^3-26x-4+\frac{8x}{x^2-5}$$

$$x^2-5\overline{)-5x^5-0x^4-x^3-4x^2+138x+20}$$

$$+5x^5 \quad +25x^3$$

$$-26x^3-4x^2+138x+20$$

$$+26x^3 \quad +0x^2 \quad +130x$$

$$-4x^2+8x+20$$

$$+4x^2 \quad +20$$

$$8x$$

Graph the rational function.

7) $f(x) = \frac{3x^2}{x^2 - 9}$

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

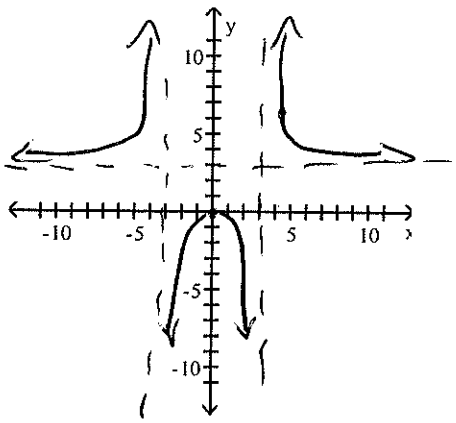
HA: $y = 3$

VA: $x = \pm 3$

$f(0) = 0$

$f(4) = \frac{3(4)^2}{4^2 - 9} = \frac{48}{7} = 6.9$

7) _____



Find the zeros for the polynomial function and give the multiplicity for each zero.

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

$x^2(x+5) - 1(x+5)$

$(x^2 - 1)(x+5)$

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

-1 mult 1
1 mult 1
8) -5 mult 1

9) $f(x) = 3(x - 1)(x + 4)^2$

1 mult 1
9) -4 mult 2

10) $f(x) = x^3 + x^2 - 6x$

$x(x^2 + x - 6)$

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

0 mult 1
-3 mult 1
10) 2 mult 1

Find a rational zero of the polynomial function and use it to find all the zeros of the function.

11) $f(x) = 3x^3 - 19x^2 + 30x - 8$

11) $2, \frac{1}{3}, 4$

$P = 8 \Rightarrow \pm 1, \pm 2, \pm 4, \pm 8$

$q = 3 \Rightarrow \pm 1, \pm 3$

$\frac{P}{q} = \pm 1, \pm 2, \pm 4, \pm 8, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{4}{3}, \pm \frac{8}{3}$

1 | 3 -19 30 -8
  | 3 -16 14
  | 3 -16 14

-1 | 3 -19 30 -8
   | -3 22 -52
   | 3 -22 52

2 | 3 -19 30 -8
  | 6 -26 8
  | 3 -13 4 | 0 ☺

$3x^2 - 13x + 4$

$(3x - 1)(x - 4)$

$x = \frac{1}{3}, 4$

12) $f(x) = x^3 + 6x^2 + 16x + 16$

12) $-2, -2 \pm 2i$

$P = 16 \Rightarrow \pm 1, \pm 2, \pm 4, \pm 8, \pm 16$

$q = 1 \Rightarrow \pm 1$

$\frac{P}{q} = \pm 1, \pm 2, \pm 4, \pm 8, \pm 16$

1 | 1 6 16 16
  | 1 7
  | 1 7 23

-1 | 1 6 16 16
   | -1 -5 -11
   | 1 5 11

2 | 1 6 16 16
  | 2 16
  | 1 8 32

-2 | 1 6 16 16
   | -2 -8 -16
   | 1 4 8 | 0 ☺

$x^2 + 4x + 8$

- can't factor

$\frac{-4 \pm \sqrt{4^2 - 4(1)(8)}}{2(1)}$

$\frac{-4 \pm \sqrt{16 - 32}}{2}$

$\frac{-4 \pm \sqrt{-16}}{2}$

$\frac{-4 \pm 4i}{2}$

$-2 \pm 2i$

Graph the function.

13) $f(x) = \frac{x^2 + x + 2}{x + 1}$

13) _____

VA: $x = -1$

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

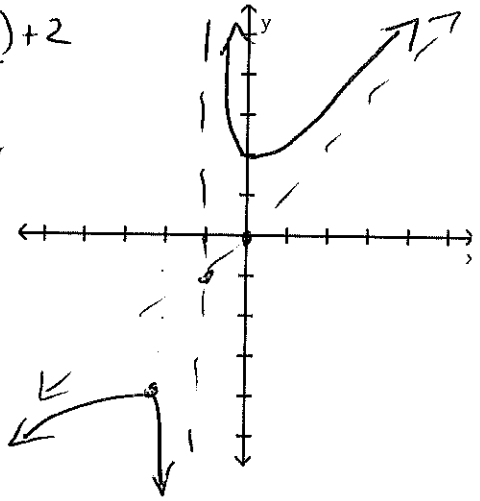
$= \frac{4}{-1} = -4$

$-1 \mid 1 \;\; 1 \;\; 2$

$\quad\quad -1 \;\; 0$

$1 \;\; 0 \;\; 2$

$x + \frac{2}{x+1}$



Find the x-intercepts (if any) for the graph of the quadratic function. Give your answers in exact form.

14) $2x^2 + 8x + 3 = 0$

14) $\frac{-4 \pm \sqrt{10}}{2}$

$\frac{-8 \pm \sqrt{8^2 - 4(2)(3)}}{2(2)}$

$\frac{-8 \pm \sqrt{64 - 24}}{4}$

$\frac{-8 \pm \sqrt{40}}{4}$

$\frac{-8 \pm 2\sqrt{10}}{4}$

15) $f(x) = -x^2 + 19x - 90$

15) 10, 9

$0 = -(x^2 - 19x + 90)$

$0 = -(x - 10)(x - 9)$

$0 = x = 10, 9$

Find the coordinates of the vertex for the parabola defined by the given quadratic function.

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

16) $(-1, -4)$

$x = \frac{-b}{2a} = \frac{-4}{2(2)} = \frac{-4}{4} = -1$

$y = 2(-1)^2 + 4(-1) - 2 = 2 - 4 - 2 = -4$

Find the y-intercept for the graph of the quadratic function.

17) $f(x) = (x - 1)^2 - 1$

17) $y = 0$

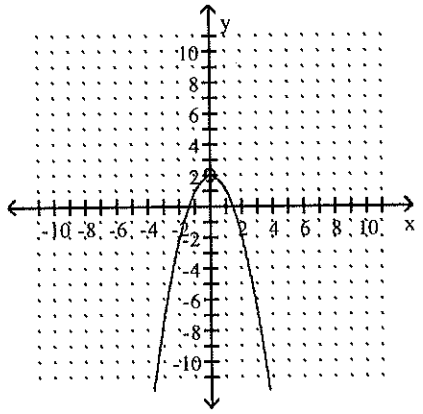
$y = (0 - 1)^2 - 1$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

The graph of a quadratic function is given. Determine the function's equation.

18) A

18)



V: (0, 2)

A) $j(x) = -x^2 + 2$

B) $g(x) = -x^2 + 4x + 4$

C) $f(x) = -x^2 - 4x - 4$

D) $h(x) = -x^2 - 2$

$-(x^2$

Use synthetic division to show that the number given to the right of the equation is a solution of the equation, then solve the polynomial equation.

19) $x^3 - 3x^2 - 10x + 24 = 0; 2$

19) _____

$x^2 - x - 12$

2 | 1 -3 -10 24
2 -2 -24
1 -1 -12 | 0

Graph the polynomial function.

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

20) _____

Positive LC

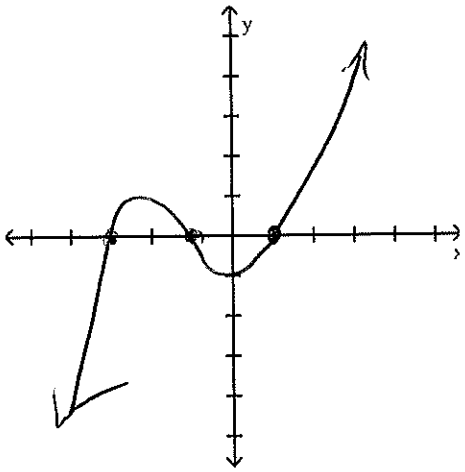
Curves = 3-1 = 2

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

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

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

$x = \pm 1, -3$



Perform the indicated operation

21) $\frac{x^4 + 3x^3 + x^2 + 5x + 3}{x + 1}$

$-1 \mid 1 \quad 3 \quad 1 \quad 5 \quad 3$

$\quad\quad -1 \quad -2 \quad 1 \quad -6$

$\quad 1 \quad 2 \quad -1 \quad 6 \quad -3$

21) $x^3 + 2x^2 - x + 6 + \frac{-3}{x+1}$

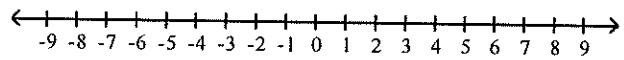
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the rational inequality and graph the solution set on a real number line. Express the solution set in interval notation.

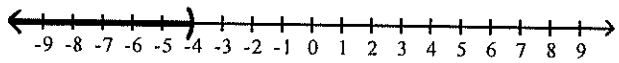
22) $\frac{x - 5}{x + 4} < 0$

$x - 5 = 0$ $\quad x + 4 = 0$ 22) B

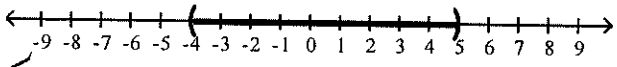
$x = 5$ $\quad x = -4$



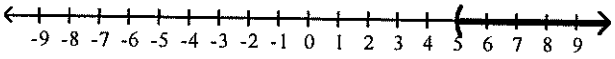
A) $(-\infty, -4)$



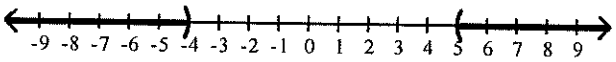
B) $(-4, 5)$



C) $(5, \infty)$



D) $(-\infty, -4)$ or $(5, \infty)$



$f(6) = \frac{6 \cdot 5}{6 + 4} < 0$

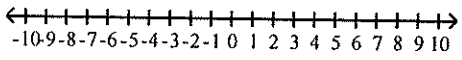
$\frac{1}{10} < 0$

11

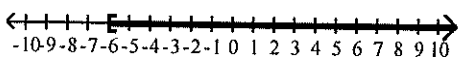
7

23) $\frac{-x - 6}{x + 7} \leq 0$

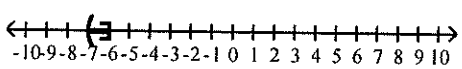
23) D



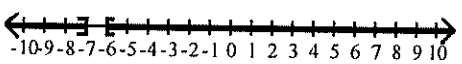
A) $[-6, \infty)$



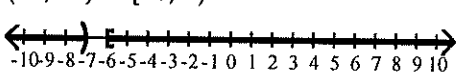
B) $(-7, -6]$



C) $(-\infty, -7]$ or $[-6, \infty)$



D) $(-\infty, -7)$ or $[-6, \infty)$



$-x - 6 \leq 0$ $\quad x + 7 \leq 0$

$x = -6$ $\quad x = -7$

$f(-8) = \frac{-(-8) \cdot 6}{-8 + 7}$ $\quad f(-5) = \frac{-1}{2} \leq 0$

7

$\frac{2}{-1} = -2 \leq 0$

True

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

24) $f(x) = x^7 + x^4 + x^2 + x + 9$ 24) C

A) 0 positive zeros, 0 negative zeros
B) 0 positive zeros, 2 or 0 negative zeros
C) 0 positive zeros, 3 or 1 negative zeros
D) 0 positive zeros, 1 negative zero

$f(-x) = -x^7 + x^4 + x^2 - x + 9$

25) $f(x) = x^5 - 1.5x^4 - 13.76x^3 + 3x^2 + 34.42x - 15.397$ 25) B

A) 3 or 1 positive zeros, 3 or 1 negative zeros
B) 3 or 1 positive zeros, 2 or 0 negative zeros
C) 2 or 0 positive zeros, 3 or 1 negative zeros
D) 2 or 0 positive zeros, 2 or 0 negative zeros

$f(-x) = -x^5 - 1.5x^4 + 13.76x^3 + 3x^2 - 34.42x - 15.397$