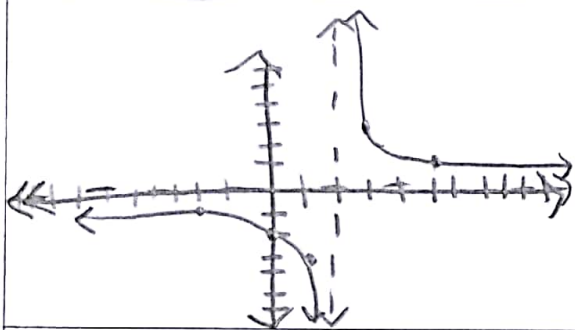
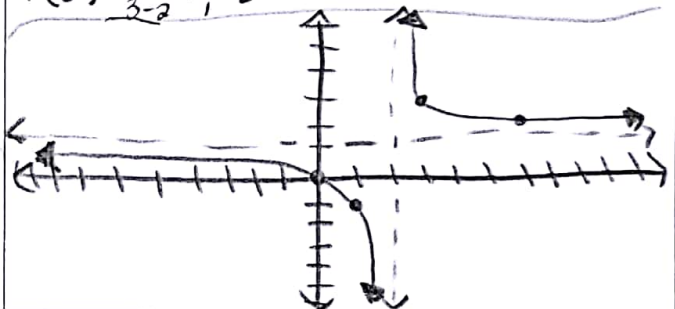


Review for Test #5

1a) $f(x) = \frac{3}{x-2}$
 x-int. $\frac{3}{x-2} = 0$
 $3 \neq 0$
 none
 y-int. $\frac{3}{0-2} = -\frac{3}{2}$
 $(0, -\frac{3}{2})$
 VA $\rightarrow x-2=0$
 $x=2$ holes \rightarrow none
 HA $\rightarrow \frac{3}{x} \rightarrow y=0$
 $f(1) = \frac{3}{1-2} = \frac{3}{-1} = -3$ $f(-2) = \frac{3}{-2-2} = \frac{-3}{4}$
 $f(3) = \frac{3}{3-2} = \frac{3}{1} = 3$ $f(5) = \frac{3}{5-2} = \frac{3}{3} = 1$



1b) $f(x) = \frac{x^2+2x}{x^2-4} = \frac{x(x+2)}{(x+2)(x-2)} = \frac{x}{x-2}$
 x-int. $\frac{x}{x-2} = 0$
 $x=0$
 $(0, 0)$
 y-int. $\frac{0}{0-2} = \frac{0}{-2} = 0$
 $(0, 0)$
 holes $\rightarrow x+2=0$
 $x=-2$
 $\frac{-2}{-2-2} = \frac{-2}{-4} = \frac{1}{2}$ $(-2, \frac{1}{2})$
 VA $\rightarrow x-2=0$
 $x=2$
 HA $\rightarrow \frac{x^2}{x^2} \rightarrow y=1$
 $f(1) = \frac{1}{1-2} = \frac{1}{-1} = -1$ $f(6) = \frac{6}{6-2} = \frac{6}{4} = \frac{3}{2}$
 $f(3) = \frac{3}{3-2} = \frac{3}{1} = 3$



2a) $f(x) = 3x+6$ $g(x) = x^2+2x-1$
 $f(g(5))$
 $g(5) = 5^2+2(5)-1$
 $25+10-1 = 34$
 $f(g(5)) = 108$
 $3(34)+6$

2b) $f(x) = 3x+6$ $g(x) = x^2+2x-1$
 $g(f(x))$
 $(3x+6)^2 + 2(3x+6) - 1$
 $9x^2 + 18x + 18x + 36 + 6x + 12 - 1$
 $9x^2 + 42x + 47$

3a)

$$4C_4 (x)^4 (-3)^0 = 1(x^4)(1) = x^4$$

$$4C_3 (x)^3 (-3)^1 = 4(x^3)(-3) = -12x^3$$

$$4C_2 (x)^2 (-3)^2 = 6(x^2)(9) = 54x^2$$

$$4C_1 (x)^1 (-3)^3 = 4(x)(-27) = -108x$$

$$4C_0 (x)^0 (-3)^4 = 1(1)(81) = 81$$

$$x^4 - 12x^3 + 54x^2 - 108x + 81$$

3b)

$$3C_3 (3x)^3 (2y^2)^0 = 1(27x^3)(1) = 27x^3$$

$$3C_2 (3x)^2 (2y^2)^1 = 3(9x^2)(2y^2) = 54x^2y^2$$

$$3C_1 (3x)^1 (2y^2)^2 = 3(3x)(4y^4) = 36xy^4$$

$$3C_0 (3x)^0 (2y^2)^3 = 1(1)(8y^6) = 8y^6$$

$$27x^3 + 54x^2y^2 + 36xy^4 + 8y^6$$

4a)

SOAP $a = \sqrt[3]{x^3} = x$
 $b = \sqrt[3]{64} = 4$

$$x^3 - 64$$

$$(a-b)(a^2+ab+b^2)$$

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

4b)

SOAP $a = \sqrt[3]{x^3} = x$

$$2x^3 + 16 \quad b = \sqrt[3]{8} = 2$$

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

$$(a+b)(a^2-ab+b^2)$$

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

5a)

$$f(-1) = (-1)^2 + 5(-1) - 2$$

$$1 - 5 - 2$$

$$\textcircled{-6}$$

5b)

$$f(-3) = 3(-3) + 4$$

$$-9 + 4$$

$$\textcircled{-5}$$

5c)

$$f(0) = 0^2 + 5(0) - 2 =$$

$$\textcircled{-2}$$

5d)

$$f(2) = 2^2 + 5(2) - 2$$

$$4 + 10 - 2$$

$$\textcircled{12}$$

6a)

$$y - y_1 = m(x - x_1) \quad m = \frac{1}{2} \quad (-3, 2)$$

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

$$y - 2 = \frac{1}{2}x + \frac{3}{2}$$

$$y = \frac{1}{2}x + \frac{7}{2}$$

6b)

$$m = \frac{-1 - 3}{9 - 0} = \frac{-4}{9}$$

$$y + 1 = \frac{-4}{9}(x - 9)$$

$$y + 1 = \frac{-4}{9}x + 4$$

$$y = \frac{-4}{9}x + 3$$

7a)

$$f(x) = x^2 - 8x + 16$$

$$f(x) - 10 = x^2 - 8x + 16$$

$$f(x) + \frac{16}{-6} = (x - 4)^2 - 6$$

$$f(x) = (x - 4)^2 - 6$$

Vertex $\rightarrow (4, -6)$

7b)

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

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

$$+\frac{3}{2} \quad +9/4 \quad x^2 - 3x + 9/4$$

$$\frac{f(x)}{-2} + \frac{3}{2} = x^2 - 3x + 9/4$$

$$\frac{f(x)}{-2} + \frac{15}{4} = (x - \frac{3}{2})^2 - \frac{15}{4}$$

$$-2 \left(\frac{f(x)}{-2} = (x - \frac{3}{2})^2 - \frac{15}{4} \right) \quad \text{Vertex}$$

$$f(x) = 2(x - \frac{3}{2})^2 - \frac{15}{2} \quad \left(\frac{3}{2}, -\frac{15}{2} \right)$$

8a)

$$f(x) = \sqrt{7-x}$$

$$7-x \geq 0$$

$$\frac{-x \geq -7}{-1} \quad \frac{-7}{-1}$$

$$x \leq 7$$

or

$$(-\infty, 7]$$

8b)

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

$$2x-3 > 0$$

$$\frac{2x > 3}{2}$$

$$x > \frac{3}{2}$$

or

$$(3/2, \infty)$$

9a)

$$\{0, \pm 4i\}$$

$$x=0 \quad (x \pm 4i)^2$$

$$x^2 = 16i^2$$

$$x^2 = -16$$

$$+16 \quad +16$$

$$x^2 + 16$$

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

$$f(x) = x^3 + 16x$$

9b)

$$\{-1, 2 \pm 3i\} \quad \swarrow \text{mem botm!}$$

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

$$x+1=0$$

$$x = 2 \pm 3i$$

$$\begin{array}{r} -2 \quad -2 \\ (x-2)^2 = (\pm 3i)^2 \end{array}$$

$$x^2 - 4x + 4 = 9i^2$$

$$\begin{array}{r} x^2 - 4x + 4 = -9 \\ +9 \quad +9 \\ \hline \end{array}$$

$$x^2 - 4x + 13 = 0$$

$$f(x) = (x+1)(x^2 - 4x + 13)$$

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

$$f(x) = x^3 - 3x^2 + 9x + 13$$

10)

$$f(x) = x^4 - 3x^3 - 4x^2 + 18x - 72$$

$$\pm 72, \pm 36, \pm 24, \pm 18, \pm 12, \pm 9, \pm 8, \pm 6, \pm 4, \pm 3, \pm 2, \pm 1$$

$$\pm 1$$

Possible Rational Zeros

$$\pm 72, \pm 36, \pm 24, \pm 18, \pm 12, \pm 9, \pm 8, \pm 6, \pm 4, \pm 3, \pm 2, \pm 1$$

$$f(4) = 0$$

$$f(-3) = 0$$

$$\begin{array}{r|rrrrr} 4 & 1 & -3 & -4 & 18 & -72 \\ & \downarrow & 4 & 4 & 0 & 72 \\ \hline -3 & 1 & -3 & 0 & 18 & 0 \\ & \downarrow & -3 & 6 & -18 & \\ \hline & 1 & -2 & 6 & 0 & \end{array}$$

Zeros

$$\{-3, 4, 1+i\sqrt{5}, 1-i\sqrt{5}\}$$

Linear Factors

$$(x+3)(x-4)(x-1-i\sqrt{5})(x-1+i\sqrt{5})$$

$$f(x) = (x^2 - 2x + 6)(x+3)(x-4)$$

$$x^2 - 2x + 6 = 0 \quad x+3 = 0 \quad x-4 = 0$$

$$x^2 - 2x + 6 = -6 + 12 \quad x = -3 \quad x = 4$$

$$\sqrt{(x-1)^2} = \sqrt{5}$$

$$x-1 = \pm i\sqrt{5}$$

$$x = 1 \pm i\sqrt{5}$$