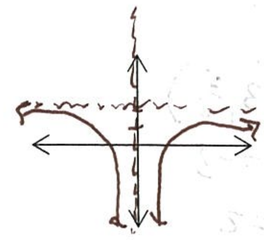
Name: Key

2.1, 2.2 & 2.5 Practice

1) [2.1] Given the function $g(x) = \frac{-1}{x^2} + 2$, sketch a graph and find:



Domain: $(-\infty, 0) \cup (0, \infty)$ Range: $(-\infty, 2)$

Intercepts: x - $\pm .71$ y - none

Continuity: Infinite discontinuous

Increasing: $(0, \infty)$ Decreasing: $(-\infty, 0)$

End Behavior: $\lim_{x \to \infty} g(x) = 2$ $\lim_{x \to -\infty} g(x) = 2$

2) [2.2] Solve by factoring: $(4x^3 + 2x^2)(-2x - 1) = 0$

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

$\underbrace{(2x^2-1)}_{=0}\underbrace{(2x+1)}_{=0} = 0$

$2x^2 - 1 = 0$

$\sqrt{x^2} = \sqrt{\frac{1}{2}}$

$x = \pm\sqrt{\frac{1}{2}}$ or $\pm\frac{\sqrt{2}}{2}$

$2x + 1 = 0$

$2x = -1$

$x = -\frac{1}{2}$

3) [2.2] Solve by factoring: $-4 = x^4 + 4x^2 + 4$

$x^2 = u$

$0 = u^2 + 4u + 4$

$0 = (u+2)^2$

$0 = \underbrace{(x^2+2)}_{=0}{}^2$

$x^2 = -2$ no real zeros

$x = \pm i\sqrt{2}$

4) [2.2] Solve by factoring: $x^4 - 81 = 0$

$(x^2-9)(x^2+9) = 0$

$\underbrace{(x-3)}_{=0}\underbrace{(x+3)}_{=0}\underbrace{(x^2+9)}_{=0} = 0$

$3, -3$, $\pm 3i$

5) [2.2] Solve by factoring: $3x^5 - 14x^3 + 8x = 0$

$x[3x^4 - 14x^2 + 8] = 0$

$x[x^4 - 14x^2 + 24] = 0$

$x^2 = u$

$x[u^2 - 14u + 24] = 0$

$x\left[\left(u - \frac{12}{3}\right)\left(u - \frac{2}{3}\right)\right] = 0$

$x[(u-4)(3u-2)] = 0$

$\underbrace{x}_{=0}\left[\underbrace{(x^2-4)}_{=0}\underbrace{(3x^2-2)}_{=0}\right] = 0$

$0, \pm 2, \pm\sqrt{\frac{2}{3}}$

also written $\pm\frac{\sqrt{6}}{3}$

6) [2.5] For the function $p(x)=\dfrac{2x^2-7x+3}{x^2-9}$, determine any asymptotes, holes, and intercepts. Then graph the function and state its domain.

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

Hole: $\left(3, \frac{5}{6}\right)$

VA: $x=-3$

HA: $y=2$

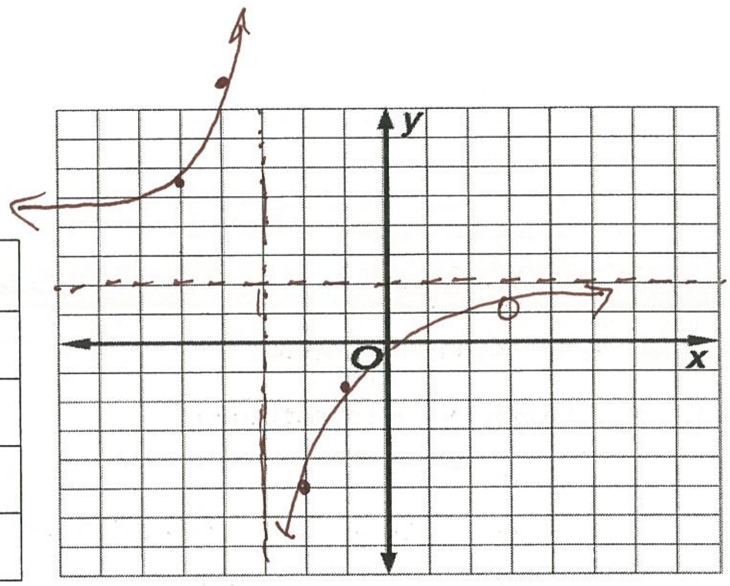
D: $(-\infty,-3)\cup(-3,3)\cup(3,\infty)$

R: $(-\infty,2)\cup(2,\frac{5}{6})\cup(\frac{5}{6},\infty)$

x	y
-4	9
-5	5.5
-2	-5
-1	-1.5

L

R



7) [2.5] Create the equation of a rational function with a) no horizontal asymptotes, b) $y=0$ and c) $y=1/3$ as asymptotes.

a) $y=\dfrac{x^5+1}{x-2}$

num > denom

b) $y=\dfrac{x^2+1}{4x^3+6}$

num < denom

c) $y=\dfrac{6x^2}{18x^2-1}$

num = denom

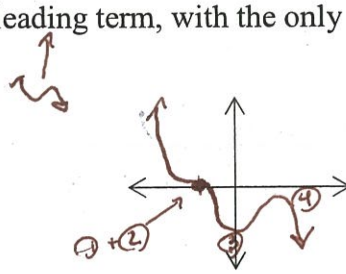
Reduce!

8) [2.2] Given a function is a polynomial to the 5[th] degree, has a negative leading term, with the only real zero of -1 with a multiplicity of 3, sketch a graph.

through x-axis

crosses

"4 humps"



9) [2.2] For $m(x)$, apply the leading term test, determine the number of turning points, determine the zeros and state the multiplicity of any repeated roots, and sketch a graph without a calculator

$m(x)=-7(x+1)^2(x-2)(x+5)$

1[st] term would be $-7x^4$

zeros

$(x+1)^2=0 \quad (x-2)=0 \quad (x+5)=0$

-1 w/ multiplicity of 2, 2, -5

so tangent