Pre – Calculus
REVIEW: 2.1, 2.2, 2.5

Name Key

2-1 Practice

For numbers 1 and 2, graph and analyze each function. Describe the domain, range, intercepts, end behavior, continuity, and where the function is increasing or decreasing.

1. $f(x) = 2x^6$

D: $(-\infty, \infty)$
R: $[0, \infty)$
Int: $(0,0)$
Inc: $(0, \infty)$
Dec: $(-\infty, 0)$

Contin: Everywhere
End behave:
$\lim_{x \to \infty} f(x) = \infty$
$\lim_{x \to -\infty} f(x) = \infty$

2. $f(x) = -\sqrt[3]{(2x + 5)^2}$

D: $(-\infty, \infty)$
R: $(-\infty, 0]$
Int: x-int: -2.5 y-int: -2.92
Inc: $(-\infty, -2.5)$
Dec: $(-2.5, \infty)$

Contin: Everywhere
End Behavi:
$\lim_{x \to \infty} f(x) = -\infty$
$\lim_{x \to -\infty} f(x) = -\infty$

2-2 Practice

For numbers 3 and 4, describe the end behavior of the graph of the polynomial function using limits.
Explain your reasoning using the leading term test.

3. $f(x) = -7x^5 - 2x^3 + 3x^2 + 5$

$\lim_{x \to \infty} f(x) = -\infty$
$\lim_{x \to -\infty} f(x) = \infty$

5 is odd opposite directions
$-$, ↑ ↓

4. $f(x) = x^6 - 2x^4 + 1$

$\lim_{x \to \infty} f(x) = \infty$
$\lim_{x \to -\infty} f(x) = \infty$

For numbers 5 and 6, state the number of possible real zeros and turning points of each function.
Then determine all of the real zeros (and their multiplicity if applicable) by factoring.

5. $f(x) = x^4 - 16x^2$

4 possible real
3 turns
real: $\pm 4, 0$
0 mult of 2

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

$0, 4, -4$

6. $f(x) = 3x^3 - 60x^2 + 300x$

3 possible real
2 turns
Real: 0, 10
10 mult of 2

$3x(x^2 - 20x + 100)$
$3x(x-10)^2$

$0, 10$

7. $f(x) = (x^3 - 3x^2)(-x + 3)$

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

3 possible: real: $\pm 1, 3$
2 turns

2-5 Practice

For numbers 8 – 10, find the domain of each function and the equations of the vertical or horizontal asymptotes, if any.

8. $f(x) = \frac{4}{x^2 + 1}$

VA: none
HA: $y = 0$
D: $(-\infty, \infty)$
R: $(-\infty, 0) \cup (0, \infty)$

9. $f(x) = \frac{2x + 1}{x + 1}$

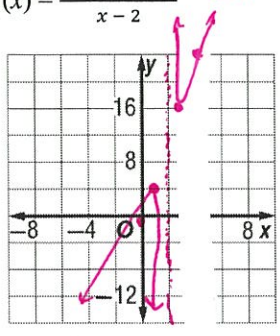
VA: $x = -1$
HA: $y = 2$
D: $(-\infty, -1) \cup (-1, \infty)$
R: $(-\infty, 2) \cup (2, \infty)$

10. $f(x) = \frac{x + 3}{(x + 1)(x - 2)}$

HA: $y = 0$
VA: $x = 2$ $x = -1$
D: $(-\infty, -1) \cup (-1, 2) \cup (2, \infty)$
R: $(-\infty, 0) \cup (0, \infty)$

For numbers 11 and 12, for each function, determine any asymptotes, holes, and intercepts. Then graph the function and state its domain.

11. $f(x) = \frac{5x^2 - 10x + 1}{x - 2}$ $(5x \quad)(x \quad)$



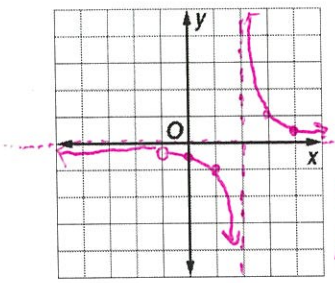
VA: $x = 2$

x	y
1	4
0	−.5
3	16
4	20.5

no holes
intercept: x-int: (.11 + 4.89)

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

hole $(-1, -\frac{1}{3})$



VA: $x = 2$
HA: $y = 0$

x	y
0	−½
1	−1
3	1
4	½

L { R {