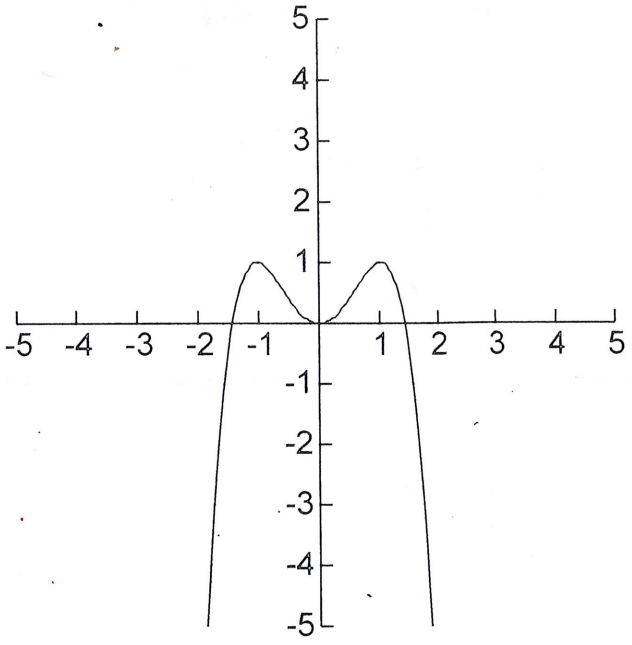
3A.6 – Polynomial Characteristics Test Review Name: Key

GSE Algebra II Date: _____

1. Answer each of the following questions for the graph (estimate the zeroes):

Domain: $\mathbb{R}$	Range: $(-\infty, 1]$
Increasing: $(-\infty, -1) \cup (0, 1)$	Decreasing: $(-1, 0) \cup (1, \infty)$
x-intercepts: $x = -1.5, 0, 0, 1.5$	y-intercept: $(0, 0)$
Rel. Max: $(-1, 1)$ $(1, 1)$	Rel. Min: $(0, 0)$
Abs. Max: $(-1, 1)$ $(1, 1)$	Abs. Min: $\emptyset$
End Behavior: $x \to \infty$, $f(x) \to -\infty$ $x \to -\infty$, $f(x) \to -\infty$	
Min. degree: 4	Sign of leading Coeff.: $-$
Symmetry: Symmetric with respect to the y-axis	

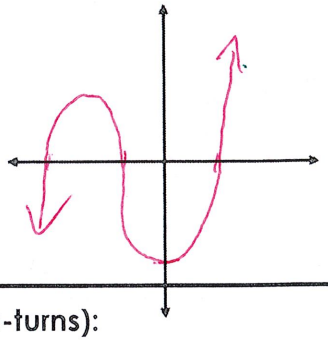


2. Sketch the graph by hand given that the zeroes are -3, -1, and 2. Then, answer each of the following questions for the graph. $f(x) = x^3 + 2x^2 - 5x - 6$

Domain: $\mathbb{R}$ # of Zeros : 3

$x \to \infty$, $f(x) \to \infty$

$x \to -\infty$, $f(x) \to -\infty$ # of Extrema : 2



3. Determine the end behavior and maximum number of extrema (u-turns):

$f(x) = -8x^5 - 7x^3 + 3x - 7$ ↕

a)
$x \to +\infty$ $f(x) \to -\infty$ extrema 4
$x \to -\infty$ $f(x) \to \infty$

$f(x) = 12 - 3x^3 + 5x^3 - 7x^4$ ∩

b)
$x \to +\infty$ $f(x) \to -\infty$ extrema 3
$x \to -\infty$ $f(x) \to -\infty$

4. Determine if the function is even, odd, or neither:

a) $f(x) = x^3 - 5x^1$
Odd

b) $f(x) = 2x^2 + 4x^1 - 6x^0$
Neither

5. State the range & # of zeros for each of the following polynomials

a) $f(x) = -(x+4)^2$ $-(x^2+8x+16)$

$-x^2-8x-16$

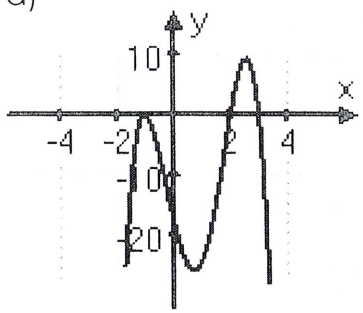
R: $(-\infty, 0]$ #of zeros: 2

b) $h(x) = 3x^3 + 4x - 7$

R: $\mathbb{R}$ #of zeros: 3

6. State the sign of the leading coefficient & the if the degree is even or odd:

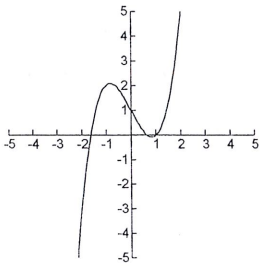
a)



Sign: −

Degree: Even

b)



Sign: +

Degree: Odd

7. True or False:

a) The **domain** of a polynomial function is always $(-\infty, \infty)$. True

b) The **range** of a quadratic polynomial function is always $(-\infty, \infty)$. False

c) Cubic polynomials never have an absolute minimum or maximum. True

d) For a polynomial, it is possible to have a relative max and an absolute max. True

Solve the following polynomial inequalities: (final answers in interval notation)

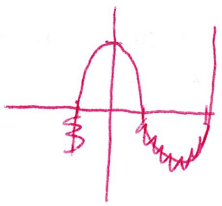
8. $(x^3 - 3x^2)(-x + 3) < 0$

$x^2(x-3) - 1(x-3) < 0$

$(x-3)(x^2-1) < 0$

$(x-3)(x+1)(x-1) < 0$

$x = 3, -1, 1$



$(-\infty, -1) \cup (1, 3)$

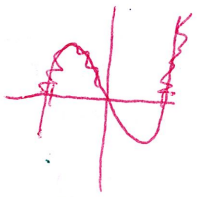
9. $x^3 - x^2 \geq 12x$

$x^3 - x^2 - 12x \geq 0$

$x(x^2 - x - 12) \geq 0$

$x(x-4)(x+3) \geq 0$

$x = 0, 4, -3$

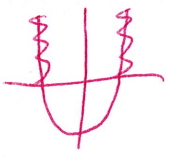


$[-3, 0] \cup [4, \infty)$

10. $64x^2 - 81 > 0$

$(8x+9)(8x-9)$

$x = \pm \frac{9}{8}$

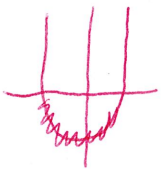


$(-\infty, -\frac{9}{8}) \cup (\frac{9}{8}, \infty)$

11. $3x^2 + x - 24 \leq 0$

$(3x+8)(x+3)$

$x = \frac{8}{3}, -3$



$[-3, \frac{8}{3}]$