P. Math 11 **Review Worksheet #2-2** Name: Key

1) Indicate the degree and the zeros for the following polynomial function:

$y = x^2(x^2+4)(x+2)(x-5)(x^2-9)$

degree = 8 zeros = $0, -2, 5, \pm 3$ [2 non-real zeros]

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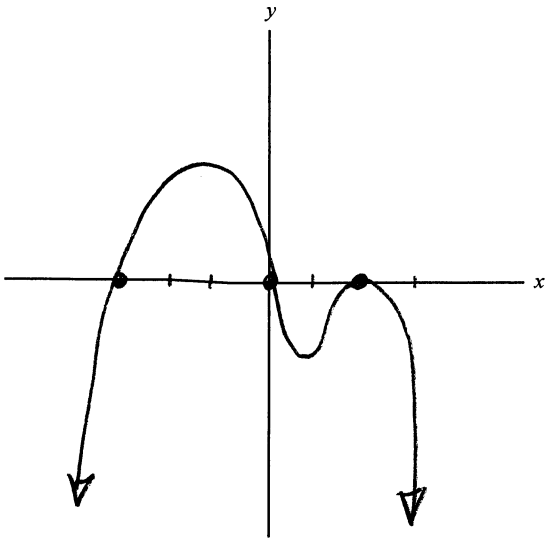
2) Sketch a graph of a polynomial that has zeros at -3, 0, 2, 2 and has a negative leading coefficient. [4th degree]

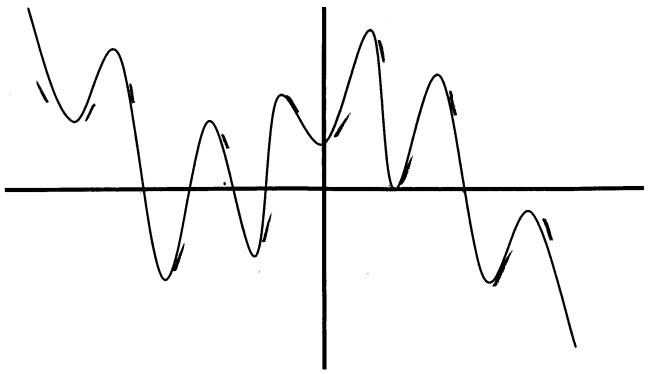


3) For the following graph of a polynomial indicate its degree and how many real and non-real zeros there are.

Degree = 13

Real Zeros: 7 (one double)

Non-Real zeros: 6



4) Solve the following by factoring. All steps must be shown.

a) $2x^3 - 32x = 0$

$2x(x^2-16)=0$

$2x(x+4)(x-4)=0$

$x = 0, \pm 4$

b) $6x^2 + 7x - 20 = 0$

$3x-4$
$2x+5$

$(2x+5)(3x-4)=0$

$x = -\frac{5}{2}, \frac{3}{4}$

5) Solve the following polynomial using a graphing calculator: (2 decimal places)

$0.1x^4 + 0.4x^3 = 1.9x^2 + 5x - 5$

6) Solve for the value(s) of k for the following equation, $4x^2 + kx + 25 = 0$, such that both roots are equal.

Easy way

$(2x \pm 5)(2x \pm 5) = 0$

$4x^2 \pm 20x + 25 = 0$

$\therefore k = \pm 20$

7) Give the equations for the following functions.

a) zeros of -4, -4, -2, -1, 1

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

b) zeros of 1, 2, 3 and passes through (4, -18)

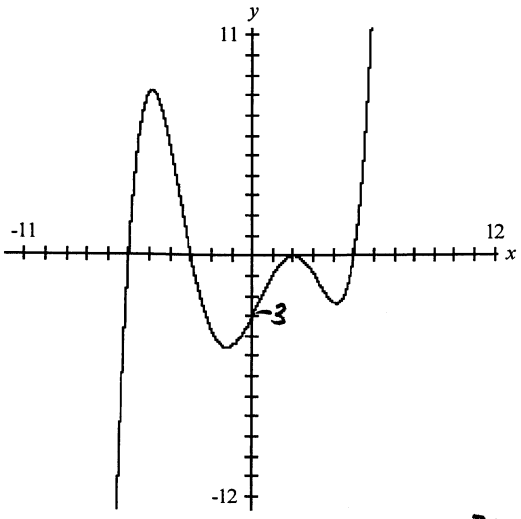
$y = a(x-1)(x-2)(x-3)$

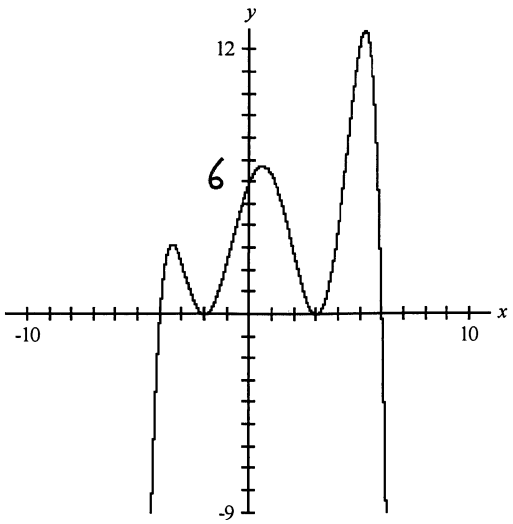
$-18 = a(3)(2)(1)$

$-3 = a$

$\therefore y = -3(x-1)(x-2)(x-3)$

8) Give the equations of the following functions.





Equation: $y = \frac{-1}{360}(x+6)(x+3)^2(x-2)^2(x-5)$

$y = a(x+6)(x+3)^2(x-2)^2(x-5)$

$-3 = a(6)(9)(4)(5)$

$\frac{-1}{360} = a$

Equation: $y = \frac{-1}{144}(x+4)(x+2)^2(x-3)^2(x-6)$

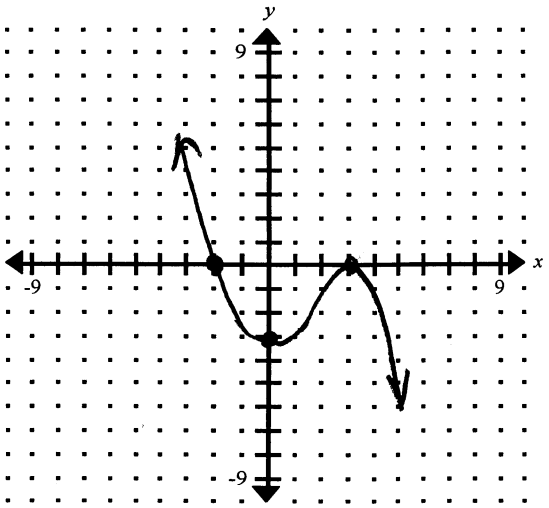
$y = a(x+4)(x+2)^2(x-3)^2(x-6)$

$6 = a(4)(4)(9)(-6)$

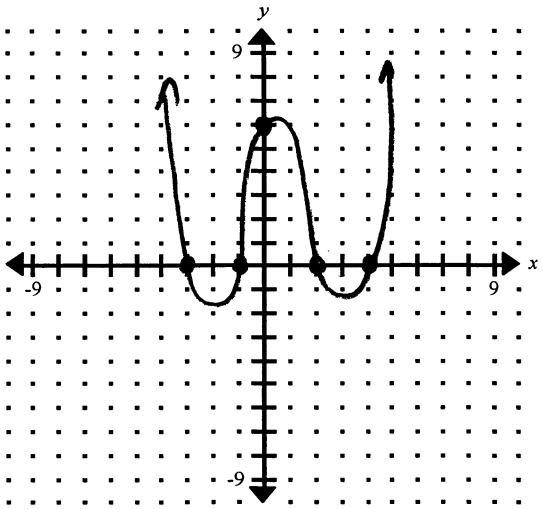
$\frac{-1}{144} = a$

9. Graph the following functions on the grids provided.

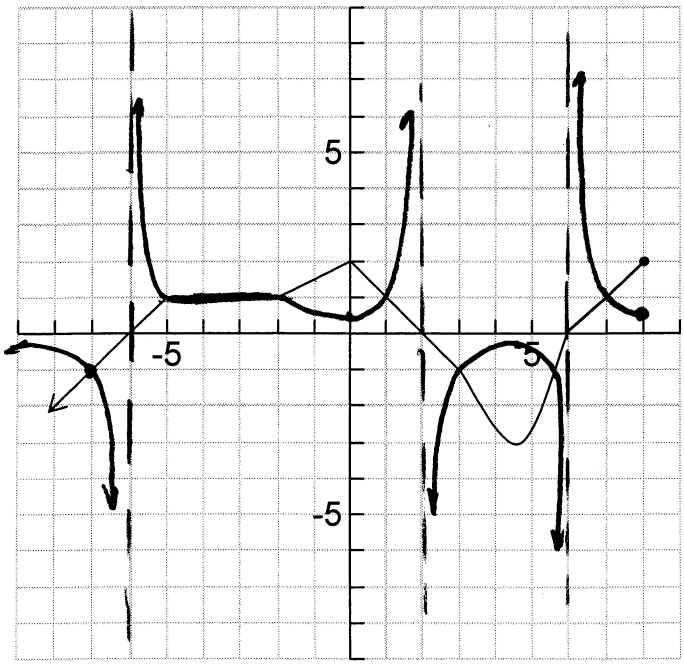
a) $y = -\frac{1}{6}(x-3)^2(x+2)$



b) $y = \frac{1}{4}(x-4)(x-2)(x+1)(x+3)$



10. Graph the reciprocal of the following function.



11. Rational Functions

But not really!

a) $y = \dfrac{-2x^2 - 4x}{x^2 - 6x + 8}$

$y = \dfrac{-2x(x+2)}{(x-2)(x-4)}$

Restrictions: $x \neq 2, 4$

Vertical asymptote (eqn) $x = 2$, $x = 4$

Hole? (where?) $\emptyset$

Domain $x \neq 2, 4$

Horizontal asymptote (eqn) $y = -2$

Slant asymptote (Yes or (No))

Range: $y \leq 0.14$ (Tricky)

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b) $y = \dfrac{x^2 + 8x}{5x - 10}$

$y = \dfrac{x(x+8)}{5(x-2)}$

Restrictions: $x \neq 2$

Vertical asymptote (eqn) $x = 2$

Hole? (where?) $\emptyset$

Domain $x \neq 2$

Horizontal asymptote (eqn) $\emptyset$

Slant asymptote ((Yes) or No)

Range: $y \geq 4.19$ & $y \leq 0.61$

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c) $y = \dfrac{x^2 - 9}{2x^2 - 16x + 30}$

$y = \dfrac{(x+3)(x-3)}{2(x-3)(x-5)}$

Restrictions: $x \neq 3, 5$

Vertical asymptote (eqn) $x = 5$

Hole? (where?) $(3, -\frac{3}{2})$

Domain $x \neq 3, 5$

Horizontal asymptote (eqn) $y = \frac{1}{2}$

Slant asymptote (Yes or (No))

Range: $y \neq \frac{1}{2}$

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d) $y = \dfrac{7x - 14}{7x^2 + 7x - 14}$

$y = \dfrac{7(x-2)}{7(x+2)(x-1)}$

Restrictions: $x \neq -2, 1$

Vertical asymptote (eqn) $x = -2$, $x = 1$

Hole? (where?) $\emptyset$ *

Domain $x \neq -2, 1$

Horizontal asymptote (eqn) $y = 0$

Slant asymptote (Yes or No)

Range: $y < \frac{1}{2}$ & $y \geq 1$ [$y \neq 0$ would do]

* Hole @ (1, 0)!

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e) $y = \dfrac{5x^3 - 20x}{x^3 + 10x^2 - 24x}$

$y = \dfrac{5x(x+2)(x-2)}{x(x+12)(x-2)}$

Restrictions: $x \neq 0, -12, 2$

Vertical asymptote (eqn) $x = -12$

Hole? (where?) $(0, \frac{5}{6})$ & $(2, \ )$

Domain $x \neq 0, -12, 2$

Horizontal asymptote (eqn) $y = 5$

Slant asymptote (Yes or No)

Range: $y \neq 5$

Note: Rational functions can cross horizontal asymptotes [a & d for example] but never a vertical asymptote