Standard 1 Review:

Name: Key

1. **Indicate which is the most specific number set each of the following values is in.** (Complex, Imaginary, Real, Rational, Irrational, Integers, Whole, or Natural)

   a. -5 Integer

   b. $\sqrt{2}$ irrational

   c. $3 + 4i$ complex

   d. $8.\overline{3}$ rational

   e. $\sqrt{-16}$ imaginary

   f. 0 whole

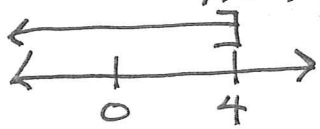
2. **Write the following inequalities in interval notation <u>and</u> state whether they are bounded or unbounded.**

   a. $x \geq -2$ $[-2, \infty)$ unbounded

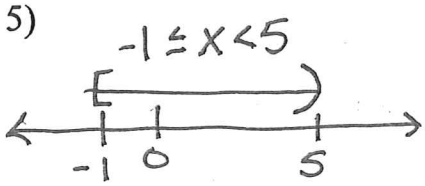
   b. $1 < x \leq 6$ $(1, 6]$ bounded

3. **Write the following intervals as inequalities <u>and</u> graph them on a number line.**

   a. $(-\infty, 4]$ $x \leq 4$



   b. $[-1, 5)$ $-1 \leq x < 5$



4. **Identify which of the following is a polynomial.**

   a. $-116x^2y^3x^4$ all 1 term

   b. $x^3 + 4x^{-2} - 2x$ ↑

   c. $x^2 + \sqrt{x} - 7$ ↑

   d. $x + 1$

5. **Identify the <u>degree</u>, <u>leading term</u>, <u>leading coefficient</u> and <u>constants</u> of each polynomial.**

   a. $2x^3 + 7x^2 - 5x + 4$

   $d = 3^0$ LT: $2x^3$
   Lc = 2
   const. = 4

   b. $9x^2 + 8x^4 - 6x^5 + 4x + 1$

   $d = 5^0$ LT: $-6x^5$
   Lc = -6
   const. = 1

6. **<u>Add/Subtract</u> the following polynomials.**

   a. $(2x^3 - 7x + 2) + (6x^2 + 6x - 9)$

   $2x^3 + 6x^2 - x - 7$

   b. $(11x^4 + 2x^2 - 5) - (4x^3 - 8x + 7)$

   $11x^4 - 4x^3 + 2x^2 + 8x - 12$

7. **<u>Multiply</u> the following polynomials.**

   a. $3x(2x^2 - 4x + 1)$

   $6x^3 - 12x^2 + 3x$

   b. $(3x + 2)(3x - 2)$

   $9x^2 - 4$

   c. $(5x + 4)^2$

   $25x^2 + 40x + 16$

   d. $(x + 2)(x^2 + 3x - 6)$

   $x^3 + 5x^2 - 12$

8. Simplify using <u>Polynomial long division</u>.

a. $\dfrac{x^4+2x^3-3x^2-8x-4}{x^3+x^2-4x-4}$

$Q = x+1 \qquad r=0$

b. $\dfrac{x^4+3x^3-7x^2-27x-18}{x^2-9}$

$Q = x^2+3x+2$

$r=0$

9. Solve (find the zeros) of the following equations Algebraically.

a. $3x+4=17$

$x = 13/3$

b. $3x^2+18x=0$

$3x(x+6)=0$

$x=0 \quad x=-6$

c. $x^2+11x=-30$

$(x+6)(x+5)=0$

$x=-6 \quad x=-5$

d. $4x^2+9x+5=0$

$x=-\frac{5}{4} \quad x=-1$

$(4x+5)(x+1)$

e. $49x^2-28x+4=0$

$(7x-2)^2=0$

$x=2/7$

f. $9x^2-64=0$

$(3x+8)(3x-8)=0$

$x=-8/3 \quad x=8/3$

g. $5(x+4)^2-720=0$

$x=-16 \quad x=8$

h. $6x^2+2x-3=0$

$x=\dfrac{-1\pm\sqrt{19}}{6}$ or $x=$ 0.56, -0.89

oops

i. $x^4+5x^3-36x^2=0$

$x^2(x+9)(x-4)=0$

$x=0 \quad x=-9 \quad x=4$

j. $x^4-41x^2+400=0$

$(x^2-25)(x^2-16)$

$x=\pm5 \quad x=\pm4$

oops

k. $x+6\sqrt{x}-27=0$

$(\sqrt{x}+9)(\sqrt{x}-3)=0$

$x=81 \quad x=9$

nope ↑ yup, works ↑

l. $x^3+2x^2-11x-12=0$

$(x+4)(x+1)(x-3)$

$x=-4 \quad x=-1 \quad x=3$

10. Simplify using <u>Synthetic division</u>.

a. $\dfrac{x^3-7x-6}{x-3}$

$Q = x^2+3x+2$

$r=0$

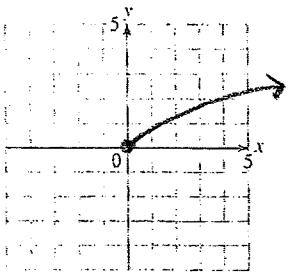
b. $\dfrac{x^4+3x^3-7x^2-27x-18}{x+1}$

$Q = x^3+2x^2-9x-18$

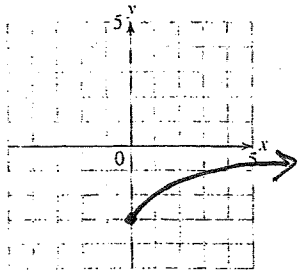
$r=0$

11. The graph of $f(x)=\sqrt{x}$ is below. <u>Sketch</u> the following related graphs.

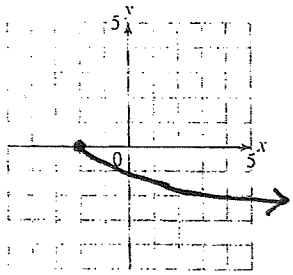
$f(x)=\sqrt{x}$



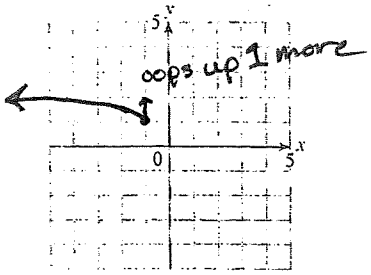
a. $f(x)=\sqrt{x}-3$



b. $f(x)=-\sqrt{x+2}$

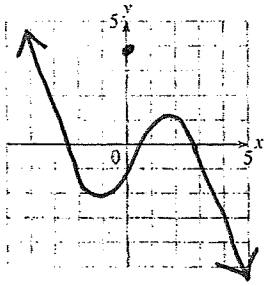


c. $f(x)=\frac{1}{2}\sqrt{-x-1}+2$

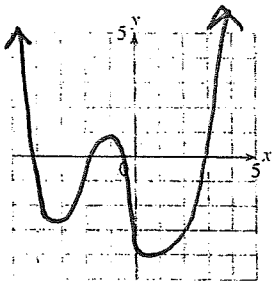


12. <u>Sketch</u> the following polynomial graphs.

a. $f(x)=-x^3+4$

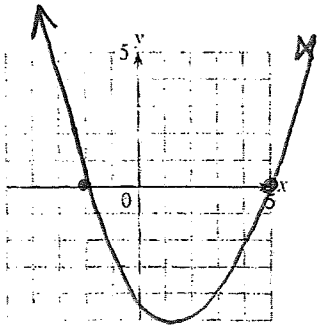


b. $f(x)=2x^4-3x^3+7x^2+8x-4$



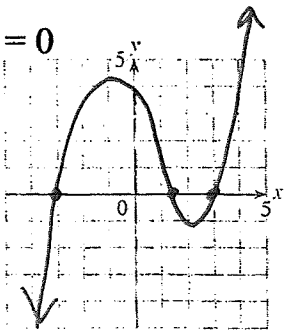
13. <u>Solve</u> the following polynomials graphically. Sketch the graphs.

a. $x^2-3x-10=0$



Zeros: $-2, 5$

b. $2x^3-3x^2-18x+27=0$



Zeros: $-3, 1.5, 3$

14. Solve (find the zeros) Algebraically.

a. $x^2 + 14x + 45 = 0$

$(x+9)(x+5)=0$

$x=-9 \quad x=-5$

b. $x^3 - 6x^2 - 16x = 0$

$x(x^2-6x-16)=0$

$x(x-8)(x+2)=0$

$x=0 \quad x=8 \quad x=-2$

15. Find a polynomial with the following zeros.

a. $x = 8,-3$

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

$x^2-5x-24$

b. $x = 0, 0, 2,-4$

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

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

$x^4+2x^3-8x^2$

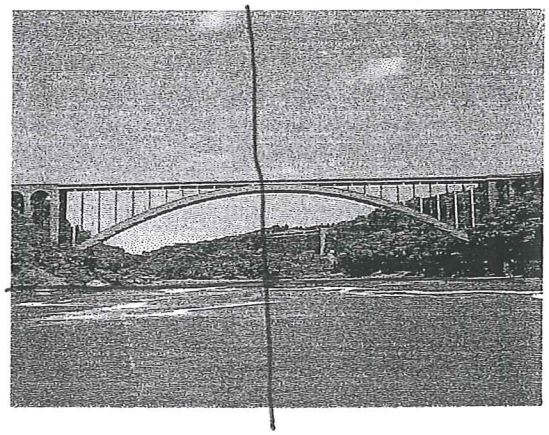
c. $x = 2,-2, 3$

$x^3-3x^2-4x+12$

d. $x = \pm1, \pm4$

x^4-17x^2+16

16. A new bridge across the Willamette Channel will use a parabolic support system. If the supports must each be 20 feet from the center of the river ($x = 0$), find an equation for the parabolic supports.



Zeros ± 20

$f(x) = -x^2+400$

What will the max height of the bridge be from the river ~~bottom~~ ($y = 0$), according to your equation?

$f(x) = 400$ ft