**Unit 2 Test Review**

**For each of the following, find all of the intercepts, the domain & range, the local and absolute extrema, and the increasing, decreaing and constant intervals.**

1) $f(x) = x^4 - 4x^2 + 2x + 2$ on the interval $(-\infty, \infty)$

2) $f(x) = x^4 - 4x^2 + 2x + 2$ on the interval $(-2, 1)$

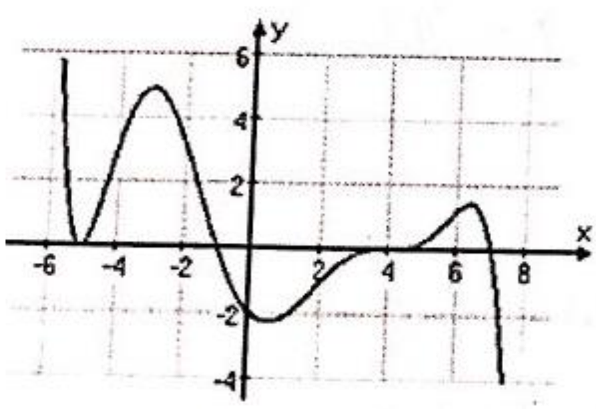
**Determine the domain, range, intercepts, holes, asymptotes, extrema, increasing and decreasing intervals for each of the following functions. Only use calculator for extrema & intervals.**

3) $f(x) = \frac{2x^2-13x+15}{2x^3-7x^2+6x}$

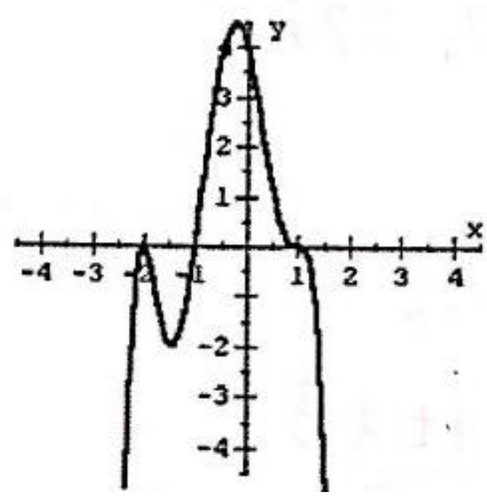
4) $g(x) = \frac{3x^3-x^2-4x}{6x^2+5x-6}$

**Write a linear factorization for the following graphs.**

5)




6)



**Find all real and complex roots using the method of your choice.**

7) $y = x^5 - x^2$

8) $f(x) = x^3 - 3x^2 + 6x - 18$

9) $g(x) = x^4 - 16$

10) $y = 2x^2 + 3x - 9$

11) $f(x) = 343x^3 + 8$

12) $h(x) = 8x^2 - 4x - 18$

13) $y = 2x^4 + 5x^3 + 4x^2 + 5x + 2$

14) $f(x) = x^3 - 8x^2 + 29x - 52$

**Sketch a graph a graph for each of the following.**

15) $y = -x(x+4)^3(x-1)^2$

16) $f(x) = 3(x^2-4)^2$

**Write the equation of the polynomial in standard form that has the given roots in standard form.**

17) A polynomial with a degree of 3 and root of 3 and $4 - i$.

18) A polynomial with a degree of 4 and root of $-2$ $w$ith a multiplicity of 2 and a root of $-2i$.

19) A polynomial with a degree of 2 and a root of $1 - 3\sqrt{2}$

**Operations With Rational Expressions-------------KEY POINTS TO REMEMBER**

- *** ALWAYS factor 1ST!!!!!!**
- *** You DO NOT need LCD when multiplying and dividing**
- *** Remember how you work with regular fractions to add them, follow the SAME process**
  - *** When adding/subtracting DO NOT cancel the factors YOU multiplied in to make the LCD before you add/subtract**

**Perform each of the following operations, write your answer in the SIMPLIEST form possible, & state the restrictions.**

20) $\frac{6x^2-7x-3}{8x^2-2x-15}$

20) $\frac{x^2+16x+55}{x^2-8x-65} \cdot \frac{x^3-11x^2-26x}{x^2+13x+22}$

21) $\frac{x^4-1}{x^3-3x^2+x-3} \cdot (4x^2-7x-15)$

22) $\frac{x^3+64}{x^2-16} \div (x^2-8x+16)$

23) $\frac{5x^2}{2x^2+5x-33} \div \frac{5x^3-20x}{2x^2+15x+22}$

24) $\frac{x-1}{x^2-17x+72} - \frac{x}{x^2-3x-54}$

25) $\frac{\frac{x}{3}+5}{7+\frac{6}{x}}$

26) $\frac{\frac{5}{x-2}}{\frac{1}{x-2}+\frac{2}{x+1}}$

27) $\frac{\frac{(x+y)^3}{x^2-y^2}}{\frac{(x^2+2xy+y^2)}{x^3-y^3}}$

**Solving Rational Equations-------------KEY POINTS TO REMEMBER**

*** Factor 1st & Simplify if you can**

*** Find the LCD & multiply EVERY SINGLE term in the equation by that LCD to clear ALL fractions.**

*** CHECK EVERY ANSWER!!!!**

28) $\frac{x-2}{x+4}+\frac{x+1}{x+6}=\frac{11x+32}{x^2+10x+24}$

29) $\frac{x+3}{x+2}=1-\frac{x+1}{x+2}$

30) $\frac{3x}{x-7}-\frac{1}{x-2}=\frac{5}{x^2-9x+14}$

31) $\frac{2}{x+3}-\frac{3}{4-x}=\frac{2x-2}{x^2-x-12}$

**Solving Rational & Polynomial Inequalities-------------KEY POINTS TO REMEMBER**

*** Factor 1st & Simplify if you can**

*** If there are rational expressions on BOTH sides you MUST move them to ONE side**

*** You CANNOT EVER multiply an INEQUALITY by the LCD on both sides**

*** When using a SIGN CHART SHOW ALL WORK!!!**

*** If using a sketch of the polynomial to solve, then you MUST CLEARLY show the LABELED SKETCH**

32) $\frac{3}{4}+\frac{x}{2}>\frac{5}{x}$

33) $\frac{6}{x+3}>x+8$

34) $\frac{8}{x-3}+\frac{8}{x+1}\geq -3$

35) $\frac{10}{x-4} + x \geq \frac{3x-2}{x-4}$

36) $(2x-4)(x-3) > 0$

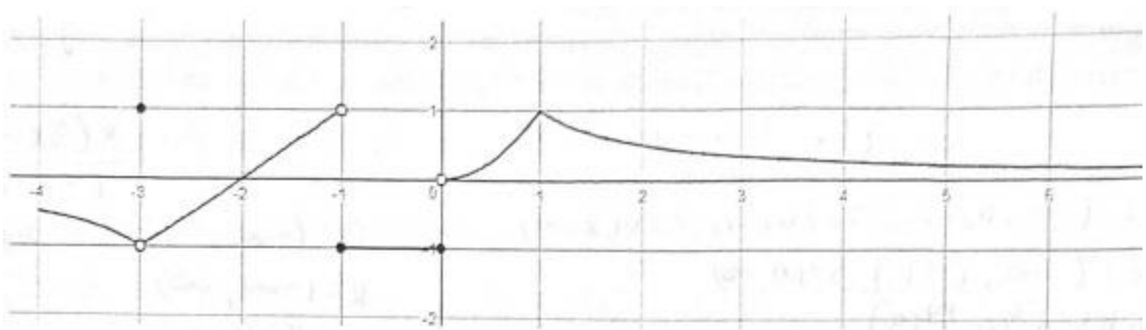
37) $\frac{(x-1)^2}{(x+1)(x+2)} > 0$

38) $\frac{x^2-4}{x^2+4} \geq 0$

39) $\frac{3+x}{3-x} \geq 1$

40) $x^3 + 9x^2 + 20x + 12 < 0$

**41) Determine the limits and evaluate the function at the given value.**



A) $\lim_{x \to -3^-} f(x) =$

B) $\lim_{x \to -3^+} f(x) =$

C) $\lim_{x \to -3} f(x) =$

D) $f(-3) =$

E) $\lim_{x \to -2^-} f(x) =$

F) $\lim_{x \to -2^+} f(x) =$

G) $\lim_{x \to -2} f(x) =$

H) $f(-2) =$

I) $\lim_{x \to -1^-} f(x) =$

J) $\lim_{x \to -1^+} f(x) =$

K) $\lim_{x \to -1} f(x) =$

L) $f(-1) =$

M) $\lim_{x \to 0^-} f(x) =$

N) $\lim_{x \to 0^+} f(x) =$

O) $\lim_{x \to 0} f(x) =$

P) $f(0) =$

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

**Graphing Rational Functions-------------KEY POINTS TO REMEMBER**

- **ALWAYS factor 1ST, if the expression simplifies there is a HOLE in the graph.**
- **If there is a hole in the graph, ALL FURTHER CALCULATIONS should be done using the SIMPLIFIED expression**
- **Real zeros of the numerator (using the SIMPLIFIED version) are x-intercepts of the function**
- **Real zeros of the denominator (using the SIMPLIFIED version) are the locations of the VERTICAL ASYMPTOTES**
- **Look at your notes for the THREE situations to determine the end behavior asymptotes of the function**
- **Look at your notes or the textbook to determine what the following notation means**
- **Asymptotes are written as EQUATIONS (look in your notes/textbook to clarify)**

**42) Determine the holes, intercepts, asymptotes, and then sketch each of the following:**

a) $f(x) = \frac{x^2-4}{x^2-9}$

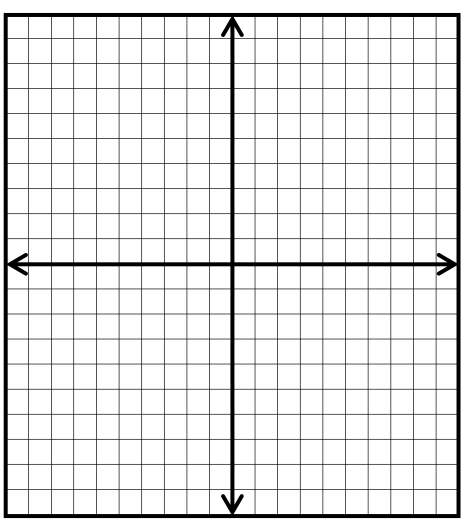
Hole(s): (___, ___) (___, ___)

$x$-int: (___, ___) (___, ___) (___, ___)

$y$-int: (___, ___)

Eqs of ALL
Asymptotes: ________________

State End Behavior



b) $f(x) = \frac{3x^2-x-4}{9x^3+9x^2-16x-16}$

Hole(s): (___, ___) (___, ___)

$x$-int: (___, ___) (___, ___) (___, ___)

$y$-int: (___, ___)

Eqs of ALL
Asymptotes:___________________

State End Behavior