Math-3   Name_____ ID: 1
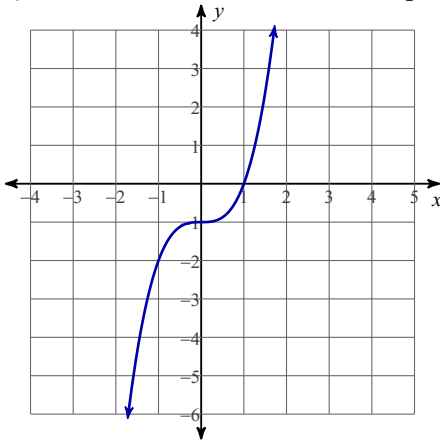SM3 HW #3-10 (Unit 3 Test Preview)   Period____

1) If applicable, give your answers in Interval Notation
   a) Where is the function increasing?
   b) Where is the function decreasing?
   c) Where is the function positive?
   d) Where is the function negative?
   e) Where is the value of the function equal to zero?
   f) What is the standard form equation of the graph?

2) Why does a graph neither increase nor decrease at the vertex of a parabola or at local or absolute
   minimums and maximums?
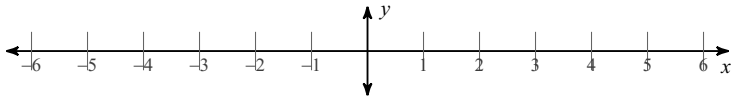
3) Graph the following intervals;

   x = (-2, 2] U (4, 6]
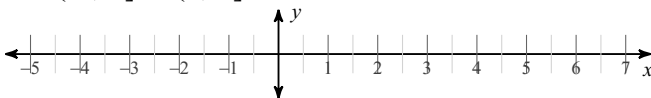
4) a) What is a "multiplicity"?

   b) Write the equation of a polynomial (in intercept form) whose zeroes are:

   x = 2, x = 4 mult-2, x = 5

5) Draw the general shape of the following polynomial. Make
   sure you label your x-axis with the correct zeroes.

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

6) $y = 6x^2 - 11x + 4$

   a) Convert the equation into intercept form.
      SHOW YOUR WORK.

   b) List the zeroes of the equation.

7) Convert the intercept form equation to
   vertex form.

   $$y = 3(x - 5)(x + 3)$$

8) Solve

   $$4 - 4x^2 = -220$$

9) Find the zeroes (SHOW YOUR WORK).

   $$y = -3(x - 2)^2 - 9$$

-2-

Find all zeros. Show your work.

10) $f(x) = 3x^3 + 10x^2 + 8x$

11) Use M-substitution:

$$f(x) = x^4 - 15x^2 + 54$$

12) a) Factor.

b) Find the zeroes.

$$f(x) = x^3 - 8$$

(a) Assuming no vertical stretching, write the intercept form polynomial for the given zeroes.
(b) Write the standard form polynomial.

13) $-1, \ -4, \ 4$

Build a table to show the possible number of real and imaginary zeros for the function. Then find all zeros. If it has a common factor of 'x', what is the first zero. If it doesn't have a common factor of 'x' then try dividing by $x + 1$ or $x - 1$ in order to find the zeroes.

14) $f(x) = x^3 - 4x^2 + 5x - 2$

Factor, then simplify.

15) $\dfrac{6n + 30}{6} \cdot \dfrac{6}{n^2 + 13n + 40}$

16) $\dfrac{k + 1}{(k + 1)^2} \div \dfrac{k - 4}{(k - 3)(k + 1)}$

17) Divide, show your work.

$\dfrac{7n^3 + 40n^2 + 30n + 30}{n + 5}$

a) Simplify the following expressions
b) state what the "excluded values" are for each

18) $\dfrac{6r}{6r^2 - 14r}$

Simplify each expression.

19) $\dfrac{2n}{6n} + \dfrac{3m - 3n}{6n}$

20) $\dfrac{2}{x + 3} - \dfrac{2x}{x - 4}$

Simplify the complex fractions

21) $\dfrac{\dfrac{2}{3}}{\dfrac{4}{x^2} - \dfrac{9}{2}}$

22) $f(x) = \dfrac{2x - 9}{x - 1}$

    a) Write the equation as quotient plus remainder over divisor
    b) Vertical Asymptote?
   c) Horizontal Asymptote?
    d) x-intercept?

23) $f(x) = \dfrac{x^2 + 5x - 14}{x + 4}$

    a) Rewrite the equation as a linear function
    (w/ remainder over divisor)
    b) What is the non-vertical asymptote?
    c) What are the x-intercepts? (Write as x-y pairs)
    d) What is the vertical asymptote?

24) Given the equation: $y = \dfrac{2}{x-3} + 4$

    a) what is the horizontal asymptote?
    b) what is the vertical asymptote?
    c) what is the domain?
    d) what is the range?

25) The following is a transformation of the function: $y = \dfrac{1}{x}$. What is the equation of the graph?
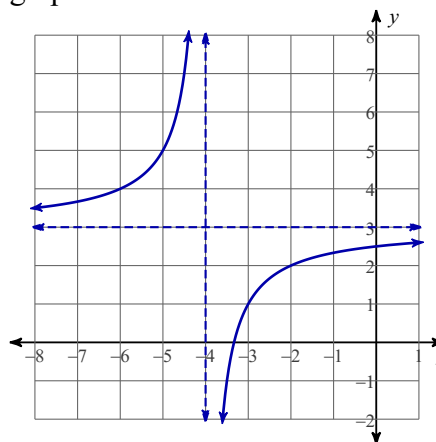
26) $y = \dfrac{x^2 - 4x - 12}{x^2 - 4}$

    a) Rewrite the equation in factored form
    b) Rewrite the equaiton in simplified form
    c) Where is the hole (write and x-y pair)
    d) What is the equation of the vertical asymptote?
    e) What are the x-intercept(s)?
    f) Write the equation of the non-vertical asymptote.
    g) What is the y-intercept?

Solve each equation. Remember to check for extraneous solutions.

27) $\dfrac{3}{n} = \dfrac{1}{5n} + \dfrac{1}{5}$

28) $\dfrac{5x - 25}{2x} - \dfrac{3x - 15}{x} = \dfrac{x + 5}{4x}$

Find all zeros of the "quadratic form" equation below

29) $f(x) = x^4 - 5x^2 - 14$

30) How many gal. of a 60% saline solution must be mixed with 3 gal. of pure water to make a 48% solution?

31) How many oz. of mixed nuts that contain 65% peanuts must Elisa add to 18 oz. of mixed nuts that contain 25% peanuts to make a mixture with 45% peanuts?

32) 1 m³ of soil containing 12% sand was mixed into 3 m³ of soil containing 32% sand. What is the sand content of the mixture?

33) 3 fl. oz. of a 80% saline solution was mixed with 2 fl. oz. of pure water. What is the concentration of the mixture?

Solve each question. Round your answer to the nearest hundredth.

34) It takes Jaidee 12 hours to mop a warehouse. Willie can mop the same warehouse in 10 hours. How long would it take them if they worked together?

35) Working alone, Jill can tar a roof in 13 hours. One day her friend Kali helped her and it only took 4.95 hours. Find how long it would take Kali to do it alone.