1. Evaluate the function below at

$$f(-5) \qquad f(0) \qquad f(1) \qquad f(2) \qquad f(5)$$

$$f(x) = \begin{cases} 3x^2 & \text{if } x < 0 \\ 0 & \text{if } 0 \le x \le 2 \\ 2x - 3 & \text{if } x > 2 \end{cases}$$

2. Simplify the expression and eliminate any negative exponents:

$$\frac{b^{-1}(bd)^2 c}{(ab^{-1}d)^2 a^{-2} b a^{-1} b}$$

3. Find the solutions to this wacky equation

$$(\pi + 1)x^2 - \sqrt{2}x + x - e = 0$$

.

$$x = \underline{\hspace{3in}}$$

4. Find the degree of f(x) (with out expanding the expression by hand).
   Find all zeros of $f(x)$.

$$f(x) = x(x-4)^2(x^2-9)^2$$

5. Find all solutions

$$x^5 - 7x^3 + 12x^2 = 0$$

6. Factor by grouping

$$(2x-3)^3 y + 4y^2(2x-3)$$

7. Solve the inequalities

$$x^2 - x < 6$$

$$|x - 4| < 10$$

$$\frac{x^2 - 16}{x - 1}$$

8. Suppose x varies jointly with y and the square of z and inversely as w. Also, x is 10 when y and w are equal and $z = 2$. Find the value of x when $y = 1$, $z = 2$ and $w = 3$.

9. The snowpack on Marquette Mountain 1 hour after a storm began was 20 inches. Six hours after the storm began the snowpack was measured to be 30 inches. Assuming the snow fell at a constant rate during the storm, find the equation of the line which models the snowpack level (in inches) t hours after the storm began. Interpret the meaning of the slope of the line in terms of the snowfall.

10. Find the equation of the perpendicular bisector of the line segment AB where $A = (-5, 10)$ and $B = (11, 8)$.

11. Solve for t.

$$20 = 10e^{.02t}$$

12. Rationalize the numerator and simplify

$$\frac{\sqrt{x+h} - \sqrt{x}}{h}$$

13. Solve for x. (Show your work!)

$$\ln\left(2x^2 - 8x + \frac{2}{e}\right) = -2$$

14. Find the values of C and a neccessary for the graph of the exponential function $f(x) = Ca^x$ to contain the points (0,3) and (5,1).

15. Answer the following questions.

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

Find the domain of the function.

Find the x-intercepts and the y-intercepts of the function.

Find the horizontal asymptotes.

Find the vertical asymptotes.

16. Perform the indicated operations and simplify

$$(a) \ (x + y)^2 - x^2 - y^2$$

$$(b) \ (\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})$$

$$(c) \ (ab)^2 - a^2 b^2 + \left(\frac{a}{b}\right)^2 - \frac{a^2}{b^2}$$

17. Factor into the product of two binomials.

$$2x^4 + 4x^3 + 2x^2 + x$$

18. Simplify

$$\frac{\left(\dfrac{1}{x}\right)}{1-\left(\dfrac{1}{x}\right)}$$

19. One number is five more than another number. The product of the two numbers is $\dfrac{\left(\pi^2 - 25\right)}{4}$. Use algebra to find the two numbers.

20. Solve by completing the square

$$x^2 - 10x - 17 = 0$$

21. Find the inverse function of

$$f(x) = (2x - 1)^3.$$

Does $g(x) = (2x - 1)^2$ have an inverse function? Find it or say why it does not exist.

Find the inverse function of

$$f(x) = \frac{x - 1}{2 - x}$$

22. If $f(x) = (x-1)^2$ and $g(x) = \sqrt{x}$. Compute

$$f(g(x)) \quad =$$

$$g(f(x)) \quad =$$

$$g(g(16)) \quad =$$

23. Compare and discuss the end-behaviors of these three functions

$$f(x) = \frac{2x+5}{x^2-10}$$

$$g(x) = \frac{x^3}{x^2+1000x}$$

$$h(x) = \frac{x^3}{4x^3+x}$$

24.

$f(x) = \ln(x+1)$

Domain: _____

Horizontal Asy: _____   Vertical Asy: _____

x-Intercepts _____   y-Intercepts _____

25.

$$f(x) = \frac{x + 150}{x^2 - 7x + 12}$$

Domain: _____

Horizontal Asy: _____   Vertical Asy: _____

x-Intercepts _____   y-Intercepts _____