Exercise Set 1 (Total Points: 100)

General Questions (0 points each)

1. What's your name? (Feel free to put any information here on how you want your name pronounced)

These questions are important so that I can plan the class better. How much do you know about the following topics on a scale from 1 to 5: (1 = I've never heard of most of those words, 2= I have some familiarity with the concepts, 3 = I learned that stuff a while ago and forgot most of it, 4 = I learned that stuff and still remember most of it, 5 = I can easily answer equastions about this material)

2. Solving equations by factoring, the quadratic formula, parabolas.
3. Surface area and volume of spheres, cones, cylinders, and pyramids.
4. Solving systems of equations.
5. Triangles, angles, the Pythagorean theorem, degrees and radians, the unit circle.
6. Expontential growth, the number e, logarithms, logarithm rules.
7. Trigonometry: the sine, cosine, and tangent function, the Pythagorian identity, the angle addition identity, the half angle identity.
8. Imaginary numbers, complex numbers, Euler's formula, completing the square.
9. Newton's second law, kinematics, velocity, energy.
10. Chemical reactions, population growth models, supply and demand curves, reaction rate equations.
11. Derivatives, the power rule, the product rule, the chain rule.
12. Integrals, the fundamental theorem of calculus, u-substitution, integration by parts.

Expanding, Factoring, and Simplifying Algebraic Expressions (3 points each)

13. Expand $x^2(xy + xy^2 + xy^3$
14. Simplify $x^2 - 2x^2 + y^2 - xy + x^2y^2 - 3y^2$
15. Expand $(x + 1)(x + 3)$

16. Expand $(x+2)^4$
17. Factor x^2+5x+6
18. Factor $y^2-18y+65$
19. Factor x^3+x^2-30x
20. Expand $\frac{1}{x}+\frac{1}{1+x^2}$
21. Simplify $-(1-t)-(t-1)(-1-t)$
22. Simplify
$$\frac{x+1}{x-1}/\frac{x-3}{x+2}$$
23. Simplify $\dfrac{x^2+4x+4}{x^2-3x-10}$ (this problem involves factoring, you may assume $x \neq -2$)
24. Simplify $Eh-h(E+r)+\frac{r}{r^2}$ (you may assume $r \neq 0$).

Solving Equations (4 points each)

25. Solve for x : $5x+3=10$
26. Solve for y : $y^2-6y+9=0$
27. Solve for t : $\frac{2t}{7}-t+1=3+t$
28. Solve for y (you answer will involve x, you may assume $x>0$):
$$y=\frac{x^3+x}{y}$$
29. Solve for r_0 :
$$r_0+1=3s_0+2$$
$$3s_0=2.7$$

Lines (5 points each)

30. Find the equation for the line with slope $m=3$ and containing the point $(1,1)$.
31. Find the equation for the line passing through the points $(0,-5)$ and $(4,1)$.
32. Consider the function $f(x)=2x-5(x+1)$. What is the slope of the graph $y=f(x)$?
33. Suppose the volume of gasoline in a tank is accuratly modeled by a line. Denote the function for volume over time $V(t)$. Suppose the initial volume is V_0 at time $t=0$. Suppose the tank is empty at time t_1. Find $V(t)$ (your answer will depend on V_0 and t_1).

Parent Functions and Graphing Functions (4 points each)

1. Sketch a graph of $y = x^2$.
2. Sketch a graph of $y = |x|$.
3. Sketch a graph of $y = e^x$.
4. Sketch a graph of $y = \frac{1}{x}$.
5. Sketch a graph of $x = 3$.
6. Sketch a graph of $y = -0.5x + 2$.