1. (4pts) Solve the equation:

$x^2 - 6x + 7 = 0$

2. (6pts) The line that passes through points $(-1, 2)$ and $(4, 0)$ is given.
a) Find the equation of this line.
b) Find the equation of the line perpendicular to the given one that passes through the point $(1, 1)$.
c) Sketch both lines on the same graph.

3. (4pts) Let $f(x) = x^2 - 9$ and $g(x) = x + 3$. Compute the following (simplify where possible):

a) $\frac{f}{g}(x) =$

b) $(f \circ g)(x) =$

4. (7pts) The quadratic function $f(x) = x^2 - 3x - 5$ is given. Do the following without using the calculator.
a) Find the x-intercepts of its graph.
b) Find the vertex of the graph.
c) Sketch the graph of the function.

5. (6pts) Use the graph of the function f, below, to answer the following questions.
a) What is $f(2)$?
b) Where is the function decreasing?
c) Where does f have a local minimum? What is its value?
d) How many solutions does the equation $f(x) = 1.5$ have?
e) What is the range of f?

6. (4pts) Evaluate (do not use the calculator):

$\log_4 64 =$ $\ln \frac{1}{e^2} =$ $\log_a(\sqrt[6]{a^7}) =$

7. (4pts) Which of the following rates yields a larger amount in 1 year? (Hint: may use a principal of \$100 to compare.)
a) 4% compounded quarterly
b) 3.95% compounded monthly.

8. (4pts) The graph of $f(x)$ is drawn below. Find the graphs of the other two functions and label all the relevant points.

$f(x)$ $f(x+2)$ $\frac{1}{2}f(x)$

9. (10pts) Consider the rational function $f(x) = \dfrac{x-1}{(x+3)(x+1)}$.

a) Find the domain of f and the vertical asymptotes of the graph.

b) Find the x-intercepts of the graph and the y-intercept.

c) f behaves like what function for large $|x|$? What is the horizonal asymptote, if any?

d) Sketch the graph of the function on paper. Make sure scale is marked and all features you found in a)-c) are indicated.

10. (2pts) Use a formula to expand: $(4x-5)^2 =$

11. (3pts) Use a formula to factor: $x^3 + 8 =$

12. (4pts) Simplify: $\dfrac{2x-1}{x^2-16} - \dfrac{x}{x^2-x-12} =$

13. (2pts) Rationalize the denominator

$$\frac{3}{5+\sqrt{2}} =$$

14. (4pts) The population of Bunny Rapids was 10,552 in on 1/1/1998. Since then, the population P has grown according to the formula $P = 10,552e^{0.035t}$, where t is the number of years since 1/1/1998. In what year will population reach 13,000?

15. (6pts) How many milliliters of a 5% solution of sulphuric acid needs to be added to 200ml of a 20% solution in order to get a 15% solution? Don't forget to write down what your variable means.

Bonus (7pts) The price p and quantity x of electric grills sold at a store in a month obey the demand equation $x = -20p + 500$, $0 \leq p \leq 25$.
a) Write the revenue R as a function of p. (Recall that $R = xp$.)
b) What price maximizes the revenue? How many grills are then sold?