MATH100 FINAL EXAM

Please write your name on your blue book. For full credit, show your work and give justifications for your answers. You may use a graphing calculator and both sides of an 8 1/2 by 11 sheet of notes on this exam. You may not use a cell phone or computer. Try not to spend too much time on any single problem; if you get stuck on a problem leave a partial answer and move on to the next. If you have time left over at the end of the exam, try to check your work.

(1) The graph of a function $f(x)$ is shown above.
  a) (5 pts) Sketch the graph of the function $g(x) = f(x - 1)$.
  b) (5 pts) Does the function $f(x)$ have an inverse $f^{-1}(x)$? Why or why not?

(2) (10 pts) Simplify: $\frac{1}{x} + \frac{x}{x-1}$.

(3) (10 pts) Suppose $g(x) = x^2 + 2x - 3$. What is $g(4)$?

(4) (10 pts) Find the equation of a line that passes through the point $(0, 0)$ and is perpendicular to the line $y = 2x + 3$.

(5) (10 pts) Give the equation of a second degree polynomial function which has zeros at -1 and 2.

(6) (10 pts) The height of a ball is given by $h(t) = -0.005t^2 + t + 5$. What is the maximum height of the ball?

(7) If $f(x) = x^2$ and $g(x) = x + 1$ what is $g(f(x))$?

(8) (10 pts) Suppose you invest \$1000 at a 10% interest rate. Approximately how long will it take your investment to double in value?

(9) (10 pts) Solve for x: $2^x = 16$.

(10) (10 pts) Give the equation of a function whose graph has the vertical asymptote $x = 0$.

Bonus (5 pts) Sketch the graph of the equation $(x - 1)^2 + y^2 = 4$.