Math 70
Extra Credit Homework

You can turn in solutions to all or some of these problems for a total of 20 extra credit points in your homework category. Feel free to ask questions during office hours about these problems.

(1) Find a number t such that the line containing the points $(4, t)$ and $(-1, 6)$ is perpendicular to the line that contains the points $(3, 5)$ and $(1, -2)$.

(2) Show that the points $(-8, -65)$, $(1, 52)$ and $(3, 77)$ do not lie on a line.

(3) Show that if x and y are positive numbers then
$$\sqrt{x+y} < \sqrt{x} + \sqrt{y}$$

(4) For the following expressions, find a number b such that the equality is true:
   (a) $\log_b 64 = 1$
   (b) $\log_b 64 = 2$
   (c) $\log_b 64 = 3$
   (d) $\log_b 64 = 6$
   (e) $\log_b 64 = \frac{3}{2}$

(5) Suppose you invest \$1,000 in a bank account where interest is compounded monthly, 12 times a year. If you have \$1,040 at the end of the first year what was the original annual interest rate? That is what was the APR?

(6) Given an APR, or annual percentage rate, and the number of times that interest is compounded each year n, write an expression that will calculate the AYR, or actual yield rate. Then use your expression to calculate the AYR for the following situations:
   (a) 9.1% APR compounded quarterly.
   (b) 4.6% APR compound monthly.
   (c) 15.9% APR compounded weekly.

(7) Suppose that $f(x)$ is a quadratic function whose vertex is at $(3, 2)$. Let $g(x) = 4x + 5$. What are the coordinates of the vertex of the graph of $g \circ f$?

(8) Suppose that $f(x) = ax^2 + bx + c$ where $a \neq 0$. Show that the vertex of a graph of f is the point $(-\frac{b}{2a}, \frac{4ac-b^2}{4a})$