# EXAM 3 - MTH 127-105 FALL 2009

Math 127-105
28 October, 2009
Instructor: Thomas Cuchta
Total points: 100 + 4 bonus

**Name:** _____

**Read all of the following information before starting the exam:**

- Show all work, clearly and in order, if you want to get full credit. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).
- Justify your answers algebraically whenever possible to ensure full credit. When you do use your calculator, sketch all relevant graphs and explain all relevant mathematics.
- Circle or otherwise indicate your final answers.
- Please keep your written answers brief; be clear and to the point.
- Good luck!

**1.** (*6 points*) Graph the piecewise function $f(x) = \begin{cases} x & -3 < x < -1 \\ x^2 & -1 \leq x < \infty \end{cases}$

**2.** (*24 points*) Suppose that $f(x) = 3x + 7$ and $g(x) = -5x - 10$.

(**a**) Solve $f(x) = 0$

(**b**) Solve $g(x) > 0$

(**c**) Solve $f(x) = g(x)$

(**d**) Solve $f(x) \leq g(x)$

**3.** (*24 points*) Draw the following graphs using function transformations.

(**a**) $f(x) = x^2 - 1$

(**b**) $g(x) = (x - 3)^2$

(**c**) $h(x) = (2x)^2$

(**d**) $k(x) = 2x^2$

**4.** (*6 points*) Compute the distance between the following two points: $(3, 7)$ and $(-5, 9)$.

**5.** (*12 points*) Suppose that the quantity supplied $S(p)$ and quantity demanded $D(p)$ where $p$ denotes price in dollars of hot dogs at a baseball game are given by the following functions: $S(p) = -300 + 470p$ and $D(p) = 700 - 30p$.

(**a**) Find the equilibrium price for hot dogs at the baseball game.

(**b**) Using part (a), find the equilibrium quantity.

**6.** (*7 points*) Find the midpoint between the following two points: $(-1, 1)$ and $(5, 7)$.

**7.** (*7 points*) Find the slope of $y = 7x + 3$ using two points on its graph and the slope formula.

**8.** (*7 points*) Factor completely: $x^2 + 10x + 21$

**9.** (*7 points*) Factor completely: $5x^2 + 4x - 1$

**Bonus Question (2 Extra Credit Points):** All polynomial functions are *smooth* and *continuous*. What does *smooth* mean?

**Bonus Question (2 Extra Credit Points):** What does *continuous* mean?