Name: _____ **Panther ID:** _____

Worksheet week 4 Calculus I Fall 2013

1. (4 pts) Sketch a graph of a function $f(x)$ satisfying **all** of the following conditions.

(i) The function is defined and continuous everywhere except $x = 0$ and $x = 3$;

(ii) $\lim_{x\to 0^-} f(x) = +\infty$ and $\lim_{x\to 0^+} f(x) = -\infty$;

(iii) $\lim_{x\to 3} f(x) = 1$;

(iv) $\lim_{x\to -\infty} f(x) = -2$ and $\lim_{x\to +\infty} f(x) = 0$.

2. (4 pts) Use the Intermediate Value Theorem to show that the equation $\cos^2 x = x$ has a real solution and locate this solution within an interval of length at most $\pi/12$. Do this problem without the use of any calculator.

3. (4 pts) Given the function below

$$g(x) = \begin{cases} a - x^2 & \text{if } x < 2 \\ bx + 2 & \text{if } 2 \le x < 3 \\ x^2 - a & \text{if } x \ge 3 \end{cases},$$

find, if possible, values for the constants a, b which will make the function $g(x)$ continuous everywhere.