

Name: _____

Panther ID: _____

Worksheet week 4

Calculus I

Spring 2016

1. Find, if possible, a value for the constant k which will make the function $g(x)$ continuous everywhere.

$$g(x) = \begin{cases} \frac{1 - \cos(kx)}{x^2} & \text{if } x < 0 \\ 1 + \sin(3x) & \text{if } x \geq 0 \end{cases},$$

2. (a) Use IVT to show that the equation $x^3 = 3x - 1$ has a solution in the interval $[0, 1]$.

(b) Approximate the solution in part (a) with an accuracy of 0.25; that is find an interval of length $1/4$ which contains the solution.

(c) Use again IVT to show that the equation $x^3 = 3x - 1$ has three real solutions and find intervals of length 1 containing each solution.

3. Use the ϵ - δ definition of limit to prove that $\lim_{x \rightarrow 5} (2x+3) = 13$.

4. **True or False** questions. Answer and briefly justify your answer in each case.

(a) If $|f(x) + 7| \leq 3|x + 2|$ for all real x , then $\lim_{x \rightarrow -2} f(x) = -7$.

(b) If $f(x)$ is continuous at $x = 2$ and $f(2) = 5$, then for x sufficiently close to 2, $f(x) > 4.95$.