1. (3 pts) Find, if possible, a value for the constant $k$ which will make the function $g(x)$ continuous everywhere.

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

2. (4 pts) True or False. Answer and briefly justify your answer in each case.

(a) If $|f(x) + 5| \leq 7|x + 3|$ for all real $x$, then $\lim_{x \to -3} f(x) = -5$.

(b) If $f(x)$ is continuous at $x = 2$ and $f(2) = 5$, then for $x$ sufficiently close to 2, $f(x) < 5.002$.

3. (4 pts) (a) Use IVT to show that the equation $x^3 = 3x - 1$ has a solution in the interval $[0, 1]$.

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