# Continuity-HW Problems

1. For what values of $x$ are the following functions continuous?

$a.\quad f(x) = \frac{2x+1}{x^2+4x+3}$

$b.\quad g(x) = \frac{x^2-9}{x+3} \quad if \quad x \neq -3$

$\qquad\quad = 6 \qquad if \quad x = -3$

$c.\quad h(x) = x + 4 \qquad if \quad x > 2$

$\qquad\quad = 10 - x^2 \qquad if \quad x \leq 2$

$d.\quad f(x) = \sqrt{36 - x^2}$

$e.\quad g(x) = \sqrt[3]{36 - x^2}$

2. Evaluate the following limits:

$a.\quad \lim_{x\to 0} \sqrt{\frac{\cos^2 x - 1}{\cos x - 1}}$

$b.\quad \lim_{x\to 1} \sin\left(\frac{x^2-1}{x-1}\right)$

3. Suppose $f(x) = \sqrt{x^2+4} + x - 3$. Show that $f(x)$ has a point $c$, where $0 < c < \sqrt{21}$ such that $f(c) = 0$.

4. Suppose $f(x) = cosx - x^5$. Show that $f(x)$ has a point $c$, where $0 < c < 2$ such that $f(c) = 0$.