

Due: Sept 22/2009 (Tuesday) by 5pm

1. Investigate $\lim_{x \rightarrow c^+} f(x)$, $\lim_{x \rightarrow c^-} f(x)$ and $\lim_{x \rightarrow c} f(x)$ for the given value(s) of c . Use the Rules for Limits in section 2.5 and Theorem 2.4.1. (No calculator justifications!)

$$(a) \quad g(x) = \begin{cases} 2x^3 - x^2 & \text{if } x \leq \frac{1}{2} \\ \cos(\pi x) & \text{if } x > \frac{1}{2} \end{cases} \quad c = \frac{1}{2}$$

$$(b) \quad f(x) = \begin{cases} 2 - x & \text{if } x < -1 \\ x & \text{if } -1 \leq x < 1 \\ (x - 1)^2 & \text{if } x \geq 1. \end{cases} \quad c = -1, c = 1$$

2. If $g(x) = \begin{cases} c^3x + 1 & \text{if } x \leq -1 \\ c^2x - 3 & \text{if } x > -1 \end{cases}$ find the value of the constant c for which

$$\lim_{x \rightarrow -1^+} g(x) = \lim_{x \rightarrow -1^-} g(x).$$

Show your work.

3. If $\lim_{x \rightarrow c} f(x) = -3$ and $\lim_{x \rightarrow c} g(x) = 4$ find each limit. Indicate which “Table 2” Rules are being used.

$$(a) \quad \lim_{x \rightarrow c} \frac{f(x) + g(x)}{2}$$

$$(b) \quad \lim_{x \rightarrow c} f(x) \cdot g(x)$$

$$(c) \quad \lim_{x \rightarrow c} f(x) \sqrt{g(x)}$$

$$(d) \quad \lim_{x \rightarrow c} \frac{3f(x)}{1 + 2g(x)}$$

4. Find each limit algebraically. No calculator or graphical solutions. Show all work.

$$(a) \quad \lim_{x \rightarrow -3} \frac{x^2 + 5x + 6}{12 + x - x^2}$$

$$(b) \quad \lim_{x \rightarrow 2} \frac{3x - 6}{\sqrt{x - 1} - 1}$$

$$(c) \quad \lim_{x \rightarrow -\sqrt{2}} \frac{x^4 - x^2 - 2}{x^2 - 2}$$

$$(d) \quad \lim_{t \rightarrow 0} \frac{(2 + t)^3 - 8}{t}$$

$$(e) \quad \lim_{x \rightarrow 2} \frac{\frac{2x-1}{x-1} - 3}{x - 2}$$

$$(f) \quad \lim_{x \rightarrow 1} \left\{ \frac{1}{x - 1} - \frac{2}{x^2 - 1} \right\}$$

$$(g) \quad \lim_{x \rightarrow 0} \frac{1 - \cos x}{x \sin x}$$