

**CALCULUS I—Worksheet #17**

1.  $f(x) = \frac{1 - \cos x}{x}$  when  $x \neq 0$ , and  $f(0) = k$ . Find  $k$  so that  $f$  is continuous at  $x = 0$ .
2.  $f(x) = \frac{x^3 - 1}{x - 1}$  when  $x \neq 1$ , and  $f(1) = k$ . Find  $k$  so that  $f$  is continuous at  $x = 1$ .
3.  $f(x) = \begin{cases} \frac{x^3 + 8}{x + 2} & \text{when } x \neq -2 \\ k & \text{when } x = -2 \end{cases}$

Find  $k$  so that  $f$  is continuous at  $x = -2$

- 4-11 Determine if the hypotheses of Rolle's Theorem (R) of the Mean Value Theorem (MVT) are satisfied. If they are, find  $c$ . If not, tell why not.
  4.  $f(x) = x^2 - 2x - 3$  on  $[-1, 3]$  R
  5.  $f(x) = \cos x$  on  $[\frac{\pi}{2}, \frac{9\pi}{2}]$  R
  6.  $f(x) = \sqrt{1 - x^2}$  on  $[-1, 1]$  R
  7.  $f(x) = 2x^2 - 8x + 1$  on  $[1, 3]$  MVT
  8.  $f(x) = \frac{1}{x^2}$  on  $[-1, 1]$  MVT
  9.  $f(x) = \sin x$  on  $[0, \pi]$  R
  10.  $f(x) = x^3 - x^2$  on  $[-1, 2]$  MVT
  11.  $f(x) = x^3 + 3x^2 + 3x$  on  $[1, 2]$  MVT
12. Find  $c$  in  $[-2, 2]$  determined by Rolle's Theorem for  $f(x) = x^4 - 4x^2$ .
13. Why doesn't Rolle's Theorem apply to  $f(x) = \frac{x+1}{x+2}$  on  $[-3, 0]$ ?
14. Why doesn't Rolle's Theorem apply to  $f(x) = \sqrt{x^2 - x^4} - \frac{1}{2}$  on  $[\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}]$ ?
15. Why doesn't Rolle's Theorem apply to  $f(x) = (x^2 - 1)e^x$  on  $[-2, 2]$ ?
16. Find  $c$  in  $[0, 1]$  determined by the Mean Value Theorem for  $f(x) = e^x$ .