

5. Absolute maximum value is $f(4) = 4$; absolute minimum value is $f(7) = 0$; local maximum values are $f(4) = 4$ and $f(6) = 3$; local minimum values are $f(2) = 1$ and $f(5) = 2$.

24. $f(x) = x^3 + x^2 - x \Rightarrow f'(x) = 3x^2 + 2x - 1.$

$$f'(x) = 0 \Rightarrow (x+1)(3x-1) = 0 \Rightarrow x = -1, \frac{1}{3}. \text{ These are the only critical numbers.}$$

34. $g(\theta) = 4\theta - \tan \theta \Rightarrow g'(\theta) = 4 - \sec^2 \theta. \quad g'(\theta) = 0 \Rightarrow \sec^2 \theta = 4 \Rightarrow \sec \theta = \pm 2 \Rightarrow \cos \theta = \pm \frac{1}{2} \Rightarrow$
 $\theta = \frac{\pi}{3} + 2n\pi, \frac{5\pi}{3} + 2n\pi, \frac{2\pi}{3} + 2n\pi, \text{ and } \frac{4\pi}{3} + 2n\pi \text{ are critical numbers.}$

Note: The values of θ that make $g'(\theta)$ undefined are not in the domain of g .

40. $f(x) = x^3 - 6x^2 + 9x + 2, \quad [-1, 4]. \quad f'(x) = 3x^2 - 12x + 9 = 3(x^2 - 4x + 3) = 3(x-1)(x-3) = 0 \Leftrightarrow x = 1, 3.$
 $f(-1) = -14, f(1) = 6, f(3) = 2, \text{ and } f(4) = 6.$ So $f(1) = f(4) = 6$ is the absolute maximum value and $f(-1) = -14$ is the absolute minimum value.

46. $f(x) = x - 2 \cos x, \quad [-\pi, \pi]. \quad f'(x) = 1 + 2 \sin x = 0 \Leftrightarrow \sin x = -\frac{1}{2} \Leftrightarrow x = -\frac{5\pi}{6}, -\frac{\pi}{6}.$
 $f(-\pi) = 2 - \pi \approx -1.14, f(-\frac{5\pi}{6}) = \sqrt{3} - \frac{5\pi}{6} \approx -0.886, f(-\frac{\pi}{6}) = -\frac{\pi}{6} - \sqrt{3} \approx -2.26, f(\pi) = \pi + 2 \approx 5.14.$
 So $f(\pi) = \pi + 2$ is the absolute maximum value and $f(-\frac{\pi}{6}) = -\frac{\pi}{6} - \sqrt{3}$ is the absolute minimum value.