Calculus Worksheet #5 Unit 2 Selected Solutions

Find all stationary points for each function and use the second derivative (if possible) to classify each as a minimum, a maximum, or neither. If the second derivative can not be used, then use any method you choose.

3. $f(x) = x^3 + 3x^2 - 9x - 15$

$f'(x) = 3x^2 + 6x - 9$

$f''(x) = 6x + 6$

$3x^2 + 6x - 9 = 0$

$x^2 + 2x - 3 = 0$

$(x + 3)(x - 1) = 0$

$x = -3$ or $x = 1$

$x = -3$

$y = f(-3) = 12$

$f''(-3) = -12 < 0$

$f(-3) = 12$ is a relative maximum.

$x = 1$

$y = f(1) = -20$

$f''(1) = 12 > 0$

$f(1) = -20$ is a relative minimum.

7. $f(x) = \dfrac{x^2 + 4}{x}$

$f(x) = x + 4x^{-1}$

$f'(x) = 1 - 4x^{-2}$

$f''(x) = 8x^{-3}$

$1 - 4x^{-2} = 0$

$x^2 - 4 = 0$

$(x + 2)(x - 2) = 0$

$x = -2$ or $x = 2$

$x = -2$

$y = f(-2) = -4$

$f''(-2) = -1 < 0$

$f(-2) = -4$ is a relative maximum.

$x = 2$

$y = f(2) = 4$

$f''(2) = 1 > 0$

$f(2) = 4$ is a relative minimum.