Allen – Math 160 A Quiz #6 Name: Key

1. Suppose we are given the cost function $C(x) = \frac{1}{2}x^2 + 12.7x + 2100$. $C(x)$ is in dollars and x is the production level.

   (a) Determine the marginal cost function, MC.

   +2 $MC(x) = C'(x) = \boxed{x + 12.7}$

   (b) Evaluate $MC(11)$, and interpret. $MC(11) = 11 + 12.7 = \boxed{23.7}$ +2

   +3 At a production level of 11 units, the cost to produce a 12th unit will be approximately \$23.70. +1

   (c) Evaluate the actual change in cost, $C(x+1) - C(x)$ when $x = 11$.

   +5 $C(12) - C(11) = \left[\frac{1}{2}(12)^2 + 12.7(12) + 2100\right] - \left[\frac{1}{2}(11)^2 + 12.7(11) + 2100\right]$ +1
   +2

   $= [72 + 152.4 + 2100] - [60.5 + 139.7 + 2100]$ +1

   $= 2324.4 - 2300.2 \approx \boxed{24.2}$ +1

2. Determine the derivative of $f(x) = 5(5x^2 - 3x - 1)^{10}$.

   +4 $f'(x) = 5 \cdot 10(5x^2 - 3x - 1)^9 \cdot \frac{d}{dx}[5x^2 - 3x - 1] = \boxed{50(5x^2-3x-1)^9(10x-3)}$
   +2 +2

3. Determine the derivative of $f(x) = (x+3)^3(2x-1)^2$.

   +6 $f'(x) = (x+3)^3 \frac{d}{dx}[(2x-1)^2] + \frac{d}{dx}[(x+3)^3](2x-1)^2$ +2

   $= (x+3)^3 \cdot 2(2x-1)^1 \cdot \frac{d}{dx}(2x-1) + 3(x+3)^2 \cdot \frac{d}{dx}[x+3](2x-1)^2$ +2

   $= \boxed{2(x+3)^3(2x-1)(2) + 3(x+3)^2(1)(2x-1)^2}$ +2

   $= 4(x+3)^3(2x-1) + 3(x+3)^2(2x-1)^2 = (x+3)^2(2x-1)[4(x+3) + 3(2x-1)]$

   $= (x+3)^2(2x-1)[4x+12+6x-3] = \boxed{(x+3)^2(2x-1)(10x+9)}$