

Calculus 7-4

1. $C(x) = 55000 + 23x + 0.012x^2$

a) $C'(x) = 23 + 0.024x$

b) $C'(100) = 23 + 0.024(100)$
 $= 23 + 2.4$
 $= \$25.4 \text{ per item}$

c) $C(100+1) - C(100)$

$= 55000 + 23(101) + 0.012(101)^2 - [55000 + 23(100) + 0.012(100)^2]$
 $= 55000 + 2323 + 122.41 - 55000 - 2300 - 120$
 $= \$25.41$

2. $C(x) = 1500 + \frac{x}{10} + \frac{x^2}{1000}$

a) $C'(x) = \frac{1}{10} + \frac{2x}{1000 \cdot 500}$
 $= \frac{1}{10} + \frac{x}{500}$

b) $C'(800) = \frac{1}{10} + \frac{800}{500}$

$= \frac{1}{10} + \frac{16}{10}$

$= \frac{17}{10} = \$1.7 \text{ per item}$

c) $C(800+1) - C(800)$

$= 1500 + \frac{801}{10} + \frac{801^2}{1000} - [1500 + \frac{800}{10} + \frac{800^2}{1000}]$
 $= 1500 + 80.1 + 641.60 - 1500 - 80 - 640$
 $= \$1.70$

7-4 cont.

3. $R(x) = 8000x - 0.02x^3$

a) $R'(x) = 8000 - 0.06x^2$

b) $R'(300) = 8000 - 0.06(300)^2$
 $= 8000 - 5400$
 $= \$2600 \text{ per item}$

c) $8000(301) - 0.02(301)^3 - [8000(300) - 0.02(300)^3]$
 $= 2408000 - 545418.02 - 2400000 + 540000$
 $= \$2581.98$

4. $C(x) = 23000 + 0.24x + 0.0001x^2$

$R(x) = 0.98x - 0.0002x^2$

a) $P(x) = 0.98x - 0.0002x^2 - (23000 + 0.24x + 0.0001x^2)$
 $= 0.98x - 0.0002x^2 - 23000 - 0.24x - 0.0001x^2$
 $= -23000 + 0.74x - 0.0003x^2$

b) $P'(x) = 0.74 - 0.0006x$

c) $P'(1000) = 0.74 - 0.0006(1000)$
 $= 0.74 - 0.6$
 $= \$0.14 \text{ per item}$

d) $-23000 + 0.74(1001) - 0.0003(1001)^2 - [-23000 + 0.74(1000) - 0.0003(1000)^2]$
 $= -23000 + 740.74 - 300.60 + 23000 - 740 + 300$
 $= \$0.14$