

Calculus Story Problems 4.1

$$(54) R = P \cdot q = q \left(\frac{1000}{q^2} + 1000 \right) = \frac{1000}{q} + 1000q$$

$$R(q) = 1000q^{-1} + 1000q \rightarrow R'(q) = \frac{-1000}{q^2} + 1000$$

$$R'(10) = \frac{-1000}{10^2} + 1000 = -10 + 1000 = \boxed{\$990 \text{ per Stereo System}}$$

$$(53) \text{ Profit} = R - C = 1000q^{-1} + 1000q - (.2q^2 + 6q + 50)$$

$$P(q) = 1000q^{-1} + 994q - .2q^2 - 50$$

$$\text{Marginal Profit} = P'(q) = \frac{-1000}{q^2} + 994 - .4q$$

$$P'(10) = \frac{-1000}{100} + 994 - 4 = -10 + 994 - 4 = \boxed{\$980 \text{ profit Per Stereo}}$$

$$(61) a) V(3) = -2159 + 1313(3) - 60.82(9) = \boxed{1232.62 \text{ cm}^3}$$

$$b) V'(t) = 1313 - 121.64t$$

$$V'(3) = 1313 - 121.64(3) = \boxed{948.08 \text{ cm}^3/\text{year}}$$

$$(64) a) 0 < x \leq 40$$

$$b) L'(x) = .2356 - .005348x$$

$$c) L'(25) = .2356 - .005348(25) = \boxed{.1019 \text{ cm/week}}$$

$$(63) V' = 2.69 \cdot 1.86 \cdot L^{0.86} = \boxed{5.0034 L^{0.86}}$$

$$(67) a) h = 74'' \quad \text{BMI} = \frac{703(220)}{74^2} = \boxed{28.24}$$

$$b) 24.9 = \frac{703x}{74^2}$$

$$136352.4 = 703x$$

$$193.957 = x$$

would have to lose 26.04246

$$c) \text{BMI} = \frac{703(125)}{h^2} = 87875 h^{-2}$$

$$\boxed{\text{BMI}'(h) = -175750 h^{-3}}$$

d) $\text{BMI}'(65) = -0.63996$ BMI decreases this amount for each inch in height change

e)

height	weight	BMI
60	180	35.15
66	200	32.277
72	220	29.834
78	240	27.732
84	260	25.904

Velocity is $\frac{\Delta \text{Position}}{\Delta \text{time}} = \frac{\Delta S}{\Delta t} = \frac{dS}{dt} = S'(t)$

72) a) $V(t) = S'(t) = -32t$

$V(1) = -32 \text{ Ft/sec}$ $V(2) = -64 \frac{\text{ft}}{\text{sec}}$

b) $-16t^2 + 144 = 0$

$144 = 16t^2$

$9 = t^2$

$t = 3 \text{ sec}$

c) $V(3) = -32(3) = -96 \frac{\text{ft}}{\text{sec}}$

74) a) $d(5) = 1.66 - .90(5) + .47(5^2)$

$= 1.66 - .45 + .1175 = 1.3275 \text{ g/cm}^3$

b) $d'(x) = -.9 + .94x$

$d'(5) = -.9 + .94(5) = -.43 \text{ g/cm}^3 \text{ per percent remaining}$

