Sec 2.6 day 2 page 143 (13-15, 17-19, 27, 33-36, 42, 43, 47, 48)

(13) $v(2) = \lim_{t \to 2} \frac{s(t) - s(2)}{t-2} = \frac{40t - 16t^2 - 16}{t-2} = \frac{-8(t-2)(2t-1)}{t-2}$

$= -24$ ∴ when $t = 2$ velocity is -24 ft/s

(14) a) $v(1) = \lim_{h \to 0} \frac{H(1+h) - H(1)}{h} = 6.28$ m/s

b) $v(a) = \lim_{h \to 0} \frac{H(a+h) - H(a)}{h} = (10 - 3.72a)$ m/s

c) $10t - 1.86t^2 = 0$

when $t = 0$ & 5.4 sec

∴ ≈ 5.4 sec

d) $10 - 3.72(5.4) = -10$ m/s

(15) $v(a) = \lim_{h \to 0} \frac{s(a+h) - s(a)}{h} = -\frac{2}{a^3}$ m/s

$v(1) = -2$ m/s

$v(2) = -\frac{2}{8} = -\frac{1}{4}$ m/s

$v(3) = -\frac{2}{27}$ m/s

(17) $g'(0), 0, g'(4), g'(2), g'(-2)$

(18) $y + 3 = 4(x - 5)$

$\boxed{y = 4x - 23}$

(19) $f(2)$ should be the same $f(2) = 3$

$m = 4$ b/c $y = 4x - 5 \rightarrow f'(2) = 4$

(27) $f'(a) = 6a - 4$

(33) $f(x) = x^{10}$ $a = 1$

(34) $f(x) = \sqrt[4]{x}$ $a = 16$

(35) $f(x) = 2^x$ $a = 5$

(36) $f(x) = \tan x$ $a = \pi/4$

(42) I used points $(0, 168)$ and $(132, 75)$ to estimate the slope.

$$m = \frac{75 - 168}{132 - 0} \approx \boxed{-.7\ ^\circ F/\text{min}}$$

(43) a) i) $\frac{N(2016) - N(2002)}{2016 - 2002} = \frac{92}{4} \approx 23$ mil cell subscribers/yr

ii) $\frac{41}{2} = 20.5$ mil iii) $\frac{32}{2} = 16$ mil

(43) b) $\frac{20.5+16}{2} = 18.25$ mil subscribers/year

c) I used points (2000, 107) and (2004, 175)

$$m = \frac{175-107}{2004-2000} = \frac{68}{4} = 17 \text{ mil subscribers/yr}$$

(47) a) $S'(x)$ is rate of change of production cost to ounces of gold produced.
Label is \$/oz

b) after 800 oz of gold were produced, the rate at which cost is increasing is \$17/oz.
To produce the 801st oz it is about \$17.

c) short term $S'(x)$ will decrease. Long term $S'(x)$ will increase why?

(48) a) $S'(s)$ is the growth rate of the bacteria population when $t=5$.
Label is bac/hr

b) With unlimited nutrients and space $S'(x)$ is increasing. Is this the reality? Why?