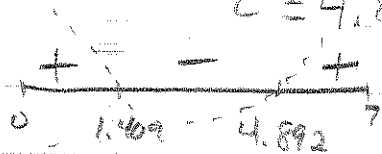


## Calculus Frosty the Story Problem

- 70) a) Smart Phones - Starting to reach saturation  
b) Answering Machine - on its way to termination  
c) open for discussion

71)  $F'(t) = 6.0828t^3 - 57.498t^2 + 125.82t + 6.0726$   
 $F''(t) = 18.2484t^2 - 114.996t + 125.82 = 0$   
 $t = 4.892 \quad t = 1.409$



Inflection pt @  $X = 1.409$   
is when rent is increasing fast  
occurred during 1999

- 78) a)  $F_0$  - population when species is introduced  
b)  $F'(c)$  - when population is increasing the fastest  
c)  $F_m$  - maximum population

82) a)  $k'(x) = \frac{4(3x^2 + 27) - (4x)(6x)}{(3x^2 + 27)^2} = \frac{12x^2 + 108 - 24x^2}{(3x^2 + 27)^2} = \frac{108 - 12x^2}{(3x^2 + 27)^2}$

$$108 - 12x^2 = 0$$

$$9 = x^2$$

$$3 = x$$

(First derivative)

A number line starting at 0. There is one point marked: 3. Above the line, the interval from 0 to 3 is labeled '+', and the interval from 3 onwards is labeled '-'. The point 3 is marked with a small vertical line and an arrow pointing to the line.

maximum @  $X = 3$

b)  $k(3) = \frac{12}{54} \approx 22\%$

90 rate is a max.  $\Rightarrow$  first derivative

$$V(x) = 1200x - 12x^2$$

$$V'(x) = 1200 - 24x = 0$$

$$\frac{1200}{24} = \frac{24x}{24}$$

$$50 = x$$

92  $s'(t) = -32t + 140 = 0$

$$\frac{140}{32} = \frac{32t}{32}$$

$$4.375 = t \Rightarrow \text{time for max height}$$

a)  $s(4.375) = 343.25 \text{ ft}$

b)  $s(t) = 0 = -16t^2 + 140t + 37$

$$t = 9.006 \quad t = -2.56$$

9.006 sec to reach ground

$$s'(9.006) = v(9.006) \approx -32(9.006) + 140 = 148.19 \text{ ft/sec}$$

94 a)  $s(10) = 1.5(100) + 40 = 190 \text{ ft}$

b)  $v(t) = s'(t) = 3t + 4$

$$v(5) = 19 \text{ ft/sec} \quad v(10) = 34 \text{ ft/sec}$$

c)  $v(t)$  is always positive for  $t \geq 0 \Rightarrow$  velocity  $\neq 0$

d)  $a(t) = v'(t) = s''(t) \Rightarrow a(t) = 3$

$$a(5) = 3 \text{ ft/sec}^2 \quad a(10) = 3 \text{ ft/sec}^2$$

e) velocity is increasing by 3 ft/sec every sec.  
acceleration is constant @ 3 ft/sec<sup>2</sup>

95 car is moving most rapidly @  $t = 6$

acceleration is positive for

$0 < t < 6 \Rightarrow$  car is accelerating

fastest interval.

after  $t = 6$  car

is decelerating.