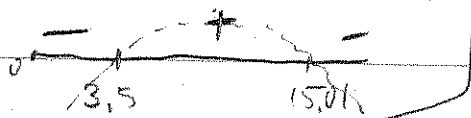


## 5.2 Story Problems Extrema

$$(45) P'(t) = -.04296t^2 + .7952t - 2.257 = 0$$

$$t \approx 3.5 \quad \& \quad t \approx 15.01$$



rel. min @  $t \approx 3.5 \approx 3:30 \text{ am}$

rel max @  $t \approx 15.1 \approx 3 \text{ pm}$

This is important because it allows you to know when you need to create the most/least power.

$$(50) a'(t) = .024t^2 - .576t + 2.304 = 0$$

$$t \approx 18.928$$

$$t \approx 5.07$$



Highest @  $5.07 \approx 5 \text{ pm}$

Lowest @  $18.928 \approx 7 \text{ am}$

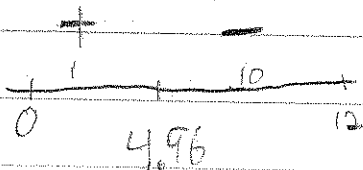
$$(52) M'(t) = 369 \left[ (\ln .93)(.93)^t (t^{.36}) + (.93)^t (.36)(t^{-.64}) \right]$$

$$= 369 (.93^t) (t^{-.64}) \left[ (\ln .93)t + .36 \right] = 0$$

$$.93^t = 0 \quad t^{-.64} = 0 \quad \ln .93 t + .36 = 0$$

$$\text{No sol} \quad t = 0$$

$$t = \frac{-.36}{\ln .93} \approx 4.96$$



Age  $\approx 4.96$  years

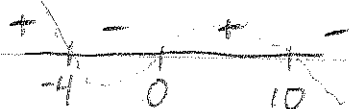
Max mass  $\approx 458.22 \text{ kg}$

$$(54) D'(x) = -4x^3 + 24x^2 + 160x = 0$$

$$-4x(x^2 - 6x - 40) = 0$$

$$-4x(x-10)(x+4) = 0$$

$$x=0 \quad x=10 \quad x=-4$$



Maximums occur @  $x = -4$

&  $x = 10$

$$D(-4) = 512$$

$$D(10) = 6000$$

$$(51) M'(t) = 6.281(.242)(t^{-.758})(e^{-.025t}) + 6.281(t^{.242})(e^{-.025t})(-.025)$$

$$0 = 6.281(t^{-.758})(e^{-.025t})[.242 - .025t]$$

$$t^{-.758} = 0 \quad e^{-.025t} = 0 \quad .242 - .025t = 0$$

$$t = 0$$

No solution

$$t = 9.68$$



Max @ 9.68 weeks

$$(55) R'(t) = \frac{20(t^2 + 100) - 20t(2t)}{(t^2 + 100)^2} = \frac{20t^2 + 2000 - 40t^2}{(t^2 + 100)^2}$$

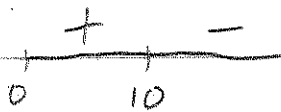
$$R'(t) = \frac{2000 - 20t^2}{(t^2 + 100)^2} = 0 \Rightarrow 2000 - 20t^2 = 0$$

$$2000 = 20t^2$$

$$100 = t^2$$

$$\pm 10 = t$$

$$t = 10$$



10 Minutes

$$(56) s'(t) = -32t + 64 = 0$$

a)  $t = 2$  sec. to vertex

$$s(2) = -64 + 128 + 3 = 67 \text{ ft}$$

b)  $s(t) = 0$

$$-16t^2 + 64t + 3 = 0$$

$$t = \frac{-64 \pm \sqrt{64^2 - 4(-16)(3)}}{-32} = 4.046 \text{ sec}$$