

# Ch 3 Review Pg 156

1.  $s = t^3 - 6t^2 + 9t + 1 \quad t \geq 0$

(a)  $s' = 3t^2 - 12t + 9$   
 $s'(4) = 3(16) - 12(4) + 9$   
 $= 9 \text{ m/s}$

(b)  $s'' = 6t - 12$   
 $s''(4) = 6(4) - 12$   
 $= 12 \text{ m/s}^2$

(c)  $s' = 3t^2 - 12t + 9 = 0$   
 $3(t^2 - 4t + 3) = 0$   
 $3(t-3)(t-1) = 0$   
 at rest at  $t=1, 3$

	$(t-3)$	$(t-1)$	$s'$
$0 \leq x < 1$	-	-	+
$1 < x < 3$	-	+	-
$x > 3$	+	+	+

Between  $0 \leq x < 1$  and  $x > 3$

(e)  $6t - 12 = 0$   
 $6t = 12$   
 $t = 2 \text{ s}$

$s'(2) = 3(4) - 12(2) + 9$   
 $= -3 \text{ m/s}$

(f)  $\left. \begin{array}{l} \text{between } 0 \text{ and } 1 \\ \text{between } 1 \text{ and } 3 \\ \text{between } 3 \text{ and } 4 \end{array} \right\} \begin{array}{l} |f(1) - f(0)| = 4 \\ |f(3) - f(1)| = 4 \\ |f(4) - f(3)| = 4 \end{array} \right\} 12 \text{ m}$

$$\#2. (a) C'(x) = 122$$

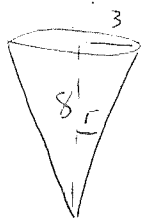
$$\begin{aligned} (b) R(x) &= x \cdot p(x) \\ &= x \left[ \frac{600000 - x}{1000} \right] \\ &= \frac{600000x - x^2}{1000} \\ &= 600x - .001x^2 \end{aligned}$$

$$(c) R'(x) = 600 - .002x$$

$$\begin{aligned} (d) P(x) &= R(x) - C(x) \\ &= 600x - .001x^2 - (87000 + 122x) \\ &= 600x - .001x^2 - 87000 - 122x \\ P(x) &= -.001x^2 + 478x - 87000 \end{aligned}$$

$$(e) P'(x) = -0.002x + 478$$

#3.



$$V = \frac{1}{3} \pi r^2 h$$

$$\frac{r}{h} = \frac{3}{8} \quad r = \frac{3h}{8}$$

Poured in at  $2 \text{ cm}^3/\text{s}$  = rate of change of volume.

What is rate of change of ~~volume~~ height when  $h=6$ .

$$V^h = \frac{1}{3} \pi \left( \frac{3h}{8} \right)^2 h \quad (\text{in terms of } h)$$

$$V = \frac{1}{3} \pi \frac{9 \cdot h^2 \cdot h}{64}$$

$$= \frac{3\pi h^3}{64}$$

$$\frac{dV}{dt} = \frac{9\pi h^2}{64} \cdot \frac{dh}{dt}$$

$$\frac{dV}{dt} = 2 \frac{\text{cm}^3}{\text{s}} \quad \text{at } h=6$$

$$\text{so: } 2 = \frac{9\pi(36)}{64} \cdot \frac{dh}{dt}$$

$$\frac{dh}{dt} = \frac{2 \cdot 64}{9\pi \cdot 36} = \frac{32}{81\pi} \approx 0.1258 \frac{\text{cm}}{\text{s}}$$

$$4. \quad x^5 = x + 2$$

$$\text{or } x^5 - x - 2 = 0$$

$$f(x) = x^5 - x - 2 \quad f'(x) = 5x^4 - 1$$

Choose  $x_1 = 1$

$$x_2 = x_1 - \frac{f(x_1)}{f'(x_1)}$$

$$x_2 = 1 - \frac{-2}{4} = 1.5$$

$$x_3 = 1.5 - \frac{f(1.5)}{f'(1.5)} \\ = 1.331619537$$

$$x_4 = 1.273516315$$

$$x_5 = 1.267236457$$

$$x_6 = 1.267168312$$

$$\boxed{x_7 = 1.2671683}$$

correct 2 6 dec. Places