3.4

13) $s = 24t - .8t^2$

(a) $v = 24 - 1.6t$

$a = -1.6$

(b) $24 - 1.6t = 0$

$\frac{24}{1.6} = \frac{1.6t}{1.6}$

$15 \text{ sec} = t$

(c) $s = 24(15) - .8(15)^2$

$= 180 \text{ meters}$

25) $y = 6\left(1 - \frac{t}{12}\right)^2$

$y = 6\left(1 - \frac{t}{6} + \frac{t^2}{144}\right)$

$y = 6 - t + \frac{1}{24}t^2$

$\frac{dy}{dt} = -1 + \frac{1}{12}t$

28) $r(x) = 2000\left(1 - \frac{1}{x+1}\right)$

$r(x) = 2000 - 2000(x+1)^{-1}$

(b) $r'(x) = 2000(x+1)^{-2} = \frac{2000}{(x+1)^2}$

(c) $r'(5) = \frac{2000}{36} \approx \$55.56$

(d) 0

29)

3.4

19) $s(t) = t^2 - 3t + 2$

(a) $f(b) - f(a) = [(5)^2 - 3(5) + 2] - [0^2 - 3(0) + 2] = 10\text{ m}$

DISPLACEMENT

(b) $\dfrac{f(b) - f(a)}{b - a} = \dfrac{10}{5} = 2\text{ m/s}$

ELAPSED TIME

(c) $s'(t) = 2t - 3 \qquad s'(4) = 2(4) - 3 = 5\text{ m/s}$

(d) $s''(t) = 2 \qquad s''(4) = 2\text{ m/s}^2$

(e) $2t - 3 = 0$

$2t = 3$

$t = \frac{3}{2}$

(f) $s\left(\frac{3}{2}\right) = \left(\frac{3}{2}\right)^2 - 3\left(\frac{3}{2}\right) + 2 = \boxed{-\frac{1}{4}\text{ m}}$

37) $x(t) = 2t^3 - 13t^2 + 22t - 5$