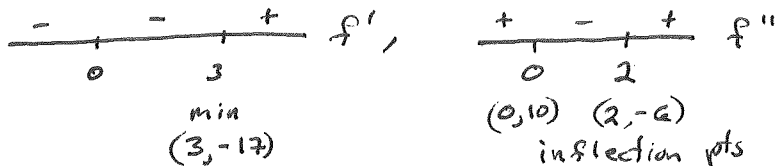
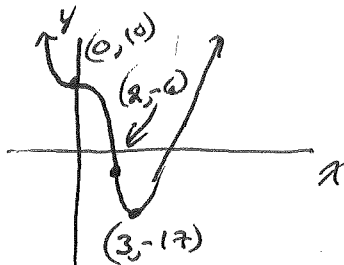


Review #2 Solutions

1. $f(x) = x^4 - 4x^3 + 10$, $f'(x) = 4x^3 - 12x^2$, $f''(x) = 12x^2 - 24x$
 $= 4x^2(x-3)$, $= 12x(x-2)$

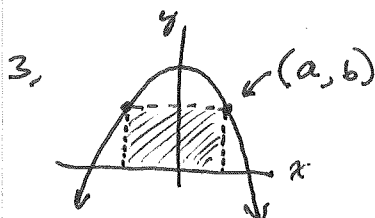


2. a) at rest $\Rightarrow v(t) = 0 \rightarrow t = 2, 8$

b) accel = 0 $\rightarrow v(t) = 0 \rightarrow t \approx 5.5$

c) speed > rel $\rightarrow v(t) < 0 \rightarrow 2 < t < 8$

d) returns to starting pt when area above t-axis = area below: $t \approx 4$



Area = base \times ht = $(2a)(b)$, $b = 12 - a^2$

$A = (2a)(12 - a^2) = 24a - 2a^3$

$A' = 24 - 6a^2 = (6)(2 - a)(2 + a)$



$a = 2, b = 8, A = 32$

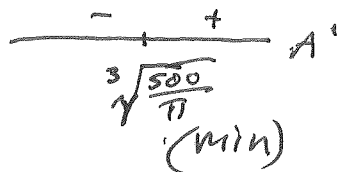
4. $A = 2\pi r h + \pi r^2$, $V = \pi r^2 h = 500 \rightarrow h = \frac{500}{\pi r^2}$



$A = 2\pi r \left(\frac{500}{\pi r^2} \right) + \pi r^2 = \frac{1000}{r} + \pi r^2$

$A' = 2\pi r - \frac{1000}{r^2}$, $A' = 0 \rightarrow r = \sqrt[3]{\frac{500}{\pi}}$

$r = \sqrt[3]{\frac{500}{\pi}}, h = \sqrt[3]{\frac{500}{\pi}}$



5. $s(t) = e^t - t^3$

a) $v(t) = e^t - 3t^2$

b) $v(t) = 0 \rightarrow t \approx 0.91$ or 3.73

c) $a(t) = e^t - 6t$

6. $y = x^2 - 5x + 3$, y -intercept = $(0, 3)$

$f'(x) = 2x - 5$, $f'(0) = -5$

~~$y = -5x + 3$~~

7. $f(x) = e^x$

$f(0) = 1 \iff$

$f'(x) = e^x$

$f'(0) = 1 \iff$

$f''(x) = e^x$

$f''(0) = 1 \iff$

$f'''(x) = e^x$

$f'''(0) = 1 \iff$

$f^{(4)}(x) = e^x$

$f^{(4)}(0) = 1 \iff$

$g(x) = ax^4 + bx^3 + cx^2 + dx + e$

$g(0) = e$

$g'(x) = 4ax^3 + 3bx^2 + 2cx + d$

$g'(0) = d$

$g''(x) = 12ax^2 + 6bx + 2c$

$g''(0) = 2c$

$g'''(x) = 24ax + 6b$

$g'''(0) = 6b$

$g^{(4)}(x) = 24a$

$g^{(4)}(0) = 24a$

$a = \frac{1}{24}$, $b = \frac{1}{6}$, $c = \frac{1}{2}$, $d = 1$, $e = 1$

(note: these are $4!$, $3!$, $2!$, $1!$, $0!$ respectively)

$e^x \approx \frac{x^4}{24} + \frac{x^3}{6} + \frac{x^2}{2} + \frac{x}{1} + 1$

$e^{1/10} \approx \frac{1}{240,000} + \frac{1}{6000} + \frac{1}{200} + \frac{1}{10} + 1 = 1.1051708\dots$

calculator value: $1.1051709\dots$