C43

①

$g(x) = (2x+4)^3(x-6)$

$g'(x) = (2x+4)^3(1) + (x-6)(3)(2x+4)^2(2)$

$= (2x+4)^3 + (6x-36)(2x+4)^2$

$= (2x+4)^2(2x+4+6x-36)$

$= (2x+4)^2(8x-32)$

$0 = 8(2x+4)^2(x-4)$

a) $g'(x)=0$ @ $x=4, -2$

b) $g'(x)<0$ | $g'(x)<0$ | $g'(x)>0$

-2 4

$g'(-3) = (8)(+)(-)$
$= -$

$g'(0) = (8)(+)(-)$
$= -$

$g'(5) = (8)(+)(+)$
$= +$

b) g IS INCREASING ON $(4, \infty)$

c) g HAS A REL MIN @ $x=4$
BECAUSE BY 1ST DER TEST
$g'(x)<0$ (DEC) ON $(-\infty, 4)$ AND
$g'(x)>0$ (INC ON $(4, \infty)$

② $f(x) = 2x + \cos(2x)$ [0,

a) $f'(x) = 2 + (-\sin(2x))(2)$

$= 2 - 2\sin(2x)$

$0 = 2 - 2\sin(2x)$

$2\sin 2x = 2$

$\sin 2x = 1$

$x = \frac{\pi}{4}$ CRIT PT

END PT $f(0) = 1$

CRIT PT $f(\frac{\pi}{4}) = \frac{\pi}{2} + 0 = \frac{\pi}{2}$

$f(\pi) = 2\pi + 1$

MAX VALUE FOR f ON $[0, \pi]$
IS $2\pi + 2$ AT $x = \pi$

b) * f IS CONT. ON $[0, \pi]$ AND
DIFF. ON $(0, \pi)$

SO AVG RATE OF CHANGE ON [0,
IS

$\frac{(2\pi+1)-1}{\pi-0} = \frac{2\pi}{\pi} = 2$

$f'(x) = 2 - 2\sin(2x)$

AND BY MVT

$2 - 2\sin(2x) = 2$
$-2 \quad\quad -2$

$-2\sin(2x) = 0$

$\sin(2x) = 0$

c) $x = 0, \frac{\pi}{2}, \pi$

CH3

3) $f(x) = \dfrac{1-4x^2}{x}$

a) $f'(x) = \dfrac{x(-8x) - (1-4x^2)}{x^2}$

$= \dfrac{-8x^2 - 1 + 4x^2}{x^2}$

$= \dfrac{-4x^2-1}{x^2}$

$\boxed{f'(x) = -4 - x^{-2}}$

f'(x) DNE AT $X=0$

b) $f'(x)=0$

$0 = -4 - x^{-2}$

$4 = -\frac{1}{x^2}$

$-4 = \frac{1}{x^2}$ NO SOLN.

$f'(x)<0$ | $f'(x)<0$

0

$f'(-1) = -4 - \frac{1}{1}$
$= -5$

$f'(1) = -5$

f(x) IS DECREASING ON $(-\infty, 0)$ AND $(0, \infty)$

c) $f''(x) = 2x^{-3}$ OR $\dfrac{2}{x^3}$

$f''(x) < 0$ WHEN $x^3 < 0$
OR
$x < 0$

f(x) IS CONCAVE DOWN WHEN $x<0$

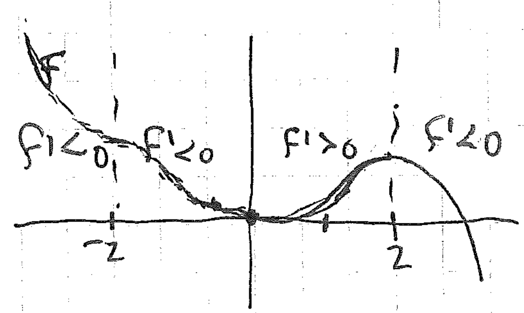
d) NO INFLECTION POINT

f IS CONC DOWN ON $(-\infty, 0)$

AND CONC UP ON $(0, \infty)$ BUT

f IS UNDEFINED (VERT ASYMP) AT
$X=0$ SO NO POI.

4)



a) REL MIN AT $X=0$
* $f'(x) < 0$ $(-\infty, 0)$
* $f'(x) > 0$ $(0, 2)$

1ST DER TEST

b) f(x) INC ON $(0,2)$, $f'>0$

c) f(x) CONC DOWN ON $(-2, -0.8)$
f' IS NEG AND DEC
f'(x) IS CONC DOWN ON $(1.3, \infty)$
f' IS DEC

4d) $\dfrac{f(-.5) - f(0)}{-.5 - 0}$ IS $\dfrac{\text{POS}}{\text{NEG}}$ (DEC)

SO THIS VALUE IS NEG

CH3

#5

a) $D'(3.5) \approx \frac{4.9-6.7}{5-2}$

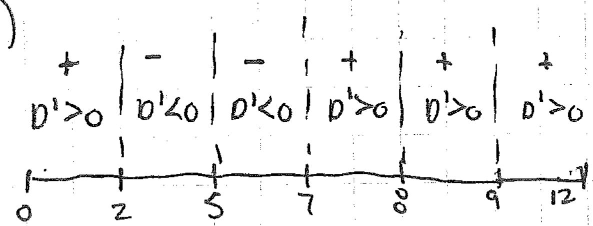
$= \frac{-1.8}{3}$

$\boxed{= -.6 \text{ or } \frac{-3}{5} \text{ m/h}}$

$D'(7.66) \approx \frac{3.1-2.3}{8-7}$

$\boxed{= \frac{.8}{1} = .8 \text{ or } \frac{4}{5} \text{ m/h}}$

b)



D'(t) CHANGES SIGN, OR GOES FROM POS TO NEG OR NEG TO POS TWICE

c) $D'(3.5) = -.6$

$D(2) = 6.7$

$L(2.5) = 6.7 + (-.6)(\overset{2.5}{x} - 2)$

$= 6.7 - .6(.5)$

$\boxed{= 6.4 \text{ METERS}}$

#8

$\boxed{D}$

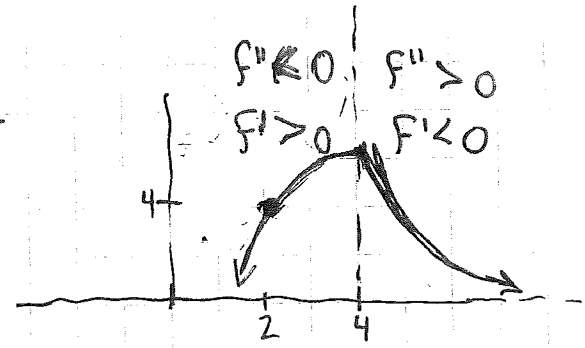
#9

$\boxed{D}$

#10

$\boxed{E}$

#7



a) $(-\infty, 4)$

b) YES
BECAUSE ON $(-\infty, 4)$ $f' > 0$ AND $(4, \infty)$ $f' < 0$ AND f IS CONT ON $(-\infty, \infty)$

c) NONE, $f''(4)$ DNE A NECESSARY COND FOR ANY INFLECTION PT IS $f''(x) = 0$

d) NO, f IS NOT DIFF AT $x = 4$

e) SEE ABOVE

#6

a) $f'(-1) = -1 + \frac{1}{3} = -\frac{2}{3}$

b) $f''(-1) = -\frac{1}{3}$

c) $f''(x) = 0$ AT $x = -4$
AND $f'' < 0$ $(-4, -3)$ AND f''
SO INF PT AT $x = -4$

d) $g'(x) = f'(x) + 2\sin x \cos$

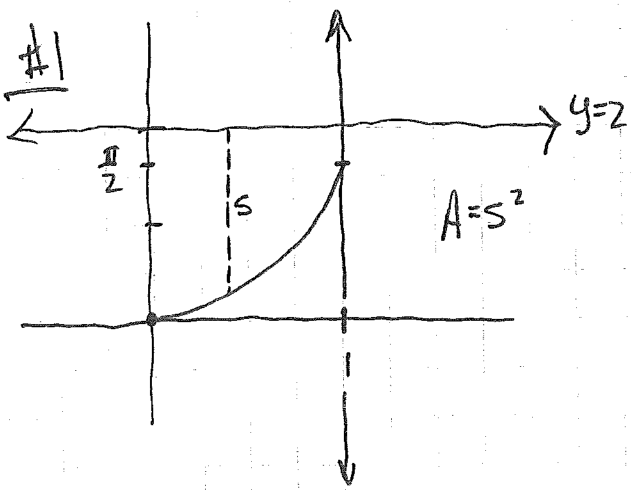
$g'(-\frac{\pi}{4}) = (-\frac{1}{3}) + (2)(-\frac{\sqrt{2}}{2})($

$= -\frac{1}{3} - 1$

$= -\frac{4}{3}$ SO DECR

CHAPTER 7

#1



$A = s^2$

$$\int_0^1 (2 - \sin^{-1}(x))^2 \, dx$$

$= 2.1842$

$\boxed{C}$

#2

$$\int_0^{1/3} (e - e^{3x}) dx$$

$e = e^{3x}$

$1 = 3x$

$\frac{1}{3} = x$

$= ex - \frac{1}{3}e^{3x} \Big|_0^{\frac{1}{3}}$

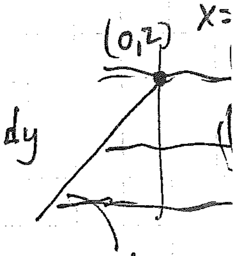
$= [(\frac{1}{3}e - \frac{1}{3}e) - (0 - \frac{1}{3})$

$= \frac{1}{3}$

$\boxed{A}$

#4

$$\int_{-2}^{2} [(\tfrac{1}{2}y^2 + 2) - (\tfrac{1}{2}y - 1)] dy$$



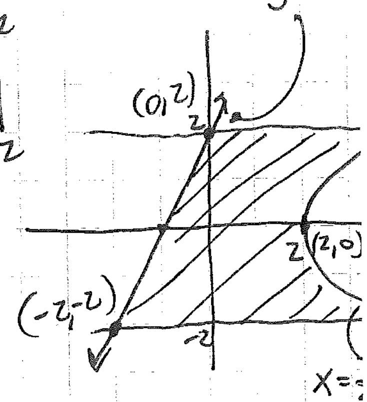
$y = 2x$-

$y - 2 = 2$

$\frac{1}{2}y - 1 =$

$$= \int_{-2}^{2} \tfrac{1}{2}y^2 - \tfrac{1}{2}y + 3 \, dy$$

$$= \tfrac{1}{6}y^3 - \tfrac{1}{4}y^2 + 3y \Big|_{-2}^{2}$$

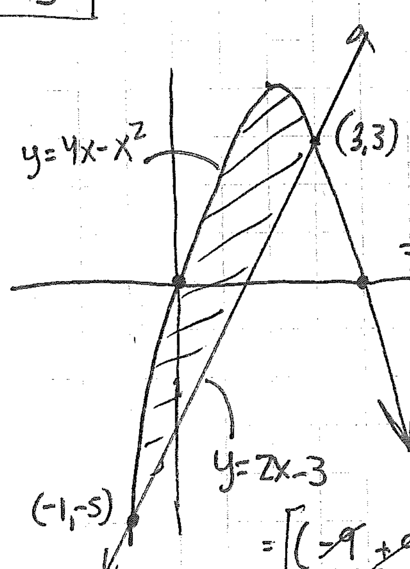


$= [(\frac{4}{3} - \cancel{1} + 6) - (-\frac{4}{3} - \cancel{1} - 6)]$

$= \frac{8}{3} + 12$

$\boxed{= \frac{44}{3} \text{ un}^2}$

#3



$$\int_{-1}^{3} [(4x - x^2) - (2x$$

$$= \int_{-1}^{3} (-x^2 + 2x +$$

$= -\frac{1}{3}x^3 + x^2 +$

$= [(\cancel{-9} + \cancel{9} + 9) - (\frac{1}{3} + \cancel{1}$

$= \frac{26}{3} \text{ un}^2$

CH 7

#5

a) $\int_0^2 (\sqrt{x})\,dx$

$= \frac{2}{3}x^{3/2} \Big|_0^2$

$\boxed{= \frac{4\sqrt{2}}{3}\ UN^2}$

b) $\pi\int_0^2 (\sqrt{x})^2\,dx$

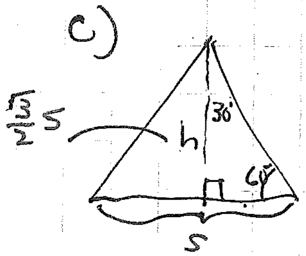
$= \pi\int_0^2 x\,dx$

$= \pi\left[\frac{1}{2}x^2\right]_0^2$

$= \pi[2]$

$\boxed{= 2\pi\ UN^3}$

c)



$A = \frac{1}{2}Bh$

$= \left(\frac{1}{2}\right)(s)\left(\frac{\sqrt{3}}{2}s\right)$

$= \frac{\sqrt{3}s^2}{4}$

$V = \frac{\sqrt{3}}{4}\int_0^2 (\sqrt{x})^2\,dx$

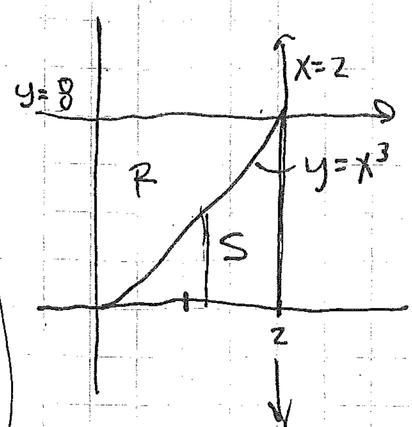
$= \frac{\sqrt{3}}{4}\int_0^2 x\,dx$

$= \frac{\sqrt{3}}{4}\left[\frac{x^2}{2}\right]_0^2$

$= \left(\frac{\sqrt{3}}{\cancel{4}_2}\right)(\cancel{2})$

$\boxed{= \frac{\sqrt{3}}{2}\ UN^3}$

#6



a) $A_R = \int_0^2 (8 - x^3)\,dx$

$= \left[8x - \frac{1}{4}x^4\right]_0^2$

$= (16 - 4)$

$\boxed{= 12\ UN^2}$

b) $\pi\int_0^2 8^2 - (x^3)^2\,dx$

$= \pi\int_0^2 64 - x^6\,dx$

$= \pi\left[64x - \frac{1}{7}x^7\right]_0^2$

$= \pi\left[128 - \frac{128}{7}\right]$

$\boxed{= \frac{768\pi}{7}\ UN^3}$

c) $A = \frac{\pi}{2}r^2$

$r = x^3$

$V = \frac{\pi}{2}\int_0^2 x^6\,dx$

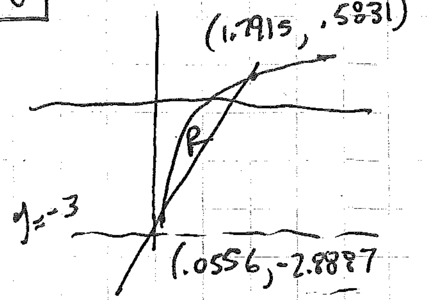
$= \frac{\pi}{2}\left[\frac{x^7}{7}\right]_0^2$

$\boxed{= \frac{64\pi}{7}\ UN^3}$

CH7

#7 BC ONLY

#8



a) $\displaystyle\int_{.0556}^{1.7915} \left(\ln x - (2x-3)\right) dx$

$\boxed{= 1.4706 \text{ un}^2}$

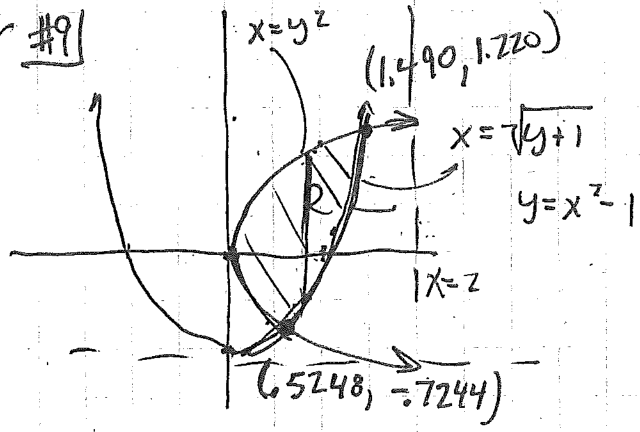
b) $\displaystyle\pi \int_{.0556}^{1.7915} \left[(\ln x + 3)^2 - (2x)^2\right] dx$

$\boxed{= 5.9789\pi \text{ un}^3} \approx 18.7832 \text{ un}^3$

c) $\boxed{\displaystyle\pi \int_{-2.888}^{.5831} \left[\left(\tfrac{1}{2}y + \tfrac{3}{2}\right)^2 - e^y\right] dy}$

$\cancel{\displaystyle\pi \int_{-2.888}^{.5831} \left[\left(\frac{y+5}{2}\right)^2 - (e^y+1)^2\right] dy}$

#9



a) $\displaystyle\int_{-.7244}^{1.22} \left(\sqrt{y+1} - y^2\right) dy$

$\boxed{= 1.3767 \text{ un}^2}$

b) $\displaystyle\pi \int_{-.7244}^{1.22} \left[(2-y^2)^2 - (2-\sqrt{y+1})^2\right] dy$

$\boxed{= 3.661\pi \text{ un}^3} \approx 11.5014 \text{ un}^3$

c) $\cancel{\displaystyle\pi \int_{0}^{.5248} \left[(\sqrt{x} + \sqrt{x}) + 1\right]^2 dx + \pi \int_{.5248}^{1.49} \left[(\sqrt{x} - x^2) + 1\right]^2 dx}$

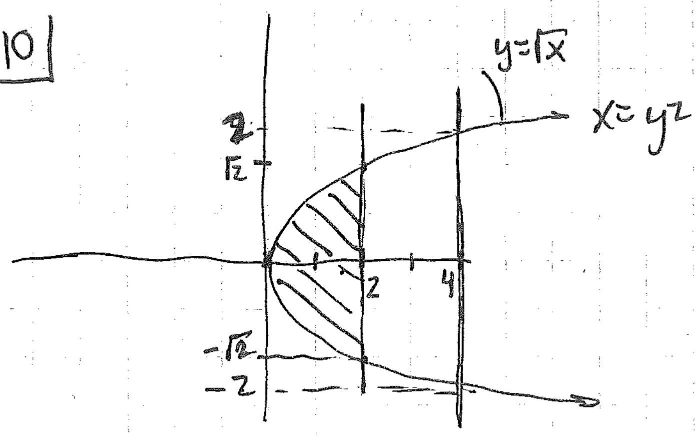
$\displaystyle= \pi \int_{0}^{.5248} \left[(\sqrt{x}+1)^2 - (-\sqrt{x}+1)^2\right] dx +$

$\displaystyle\pi \int_{.5248}^{1.49} \left[(\sqrt{x}+1)^2 - (x^2 \cancel{-1+1})^2\right] dx$

$\boxed{\displaystyle= \pi \left[\int_{0}^{.5248} \left[(\sqrt{x}+1)^2 - (1-\sqrt{x})^2\right] dx \int_{.5248}^{1.49} \left[(\sqrt{x}+1)^2 - (x^2)\right] d\right.}$

CH7

#10



a)

$$\pi\int_0^2 (\sqrt{x})^2\,dx$$

$$= \pi\int_0^2 x\,dx$$

$$= \pi\left[\frac{x^2}{2}\right]_0^2$$

$$\boxed{= 2\pi \text{ un}^3}$$

b)

$$2\pi\int_0^{\sqrt{2}} (2-y^2)^2\,dy$$

$$= 2\pi\int_0^{\sqrt{2}} (4-4y^2+y^4)\,dy$$

$$= 2\pi\left[4y-\frac{4}{3}y^3+\frac{1}{5}y^5\right]_0^{\sqrt{2}}$$

$$= 2\pi\left[4\sqrt{2}-\frac{8\sqrt{2}}{3}+\frac{4\sqrt{2}}{5}\right]$$

$$= 2\pi\left[4\sqrt{2}-\frac{2}{3}(4\sqrt{2})+\frac{1}{5}(4\sqrt{2})\right]$$

$$= (8\sqrt{2})\pi\left[1-\frac{2}{3}+\frac{1}{5}\right]$$

$$\boxed{= \frac{64\sqrt{2}}{15}\pi \text{ un}^3}$$

c)

$$\pi\int_0^2 \left[(\sqrt{x}+2)^2-(-\sqrt{x}+2)^2\right]dx$$