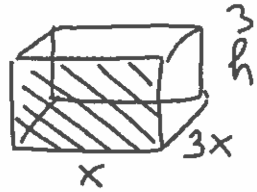
CPT for Math 3208

6.



$V = l \cdot w \cdot h$

$36\ m^3 = x \cdot 3x \cdot h$

$36 = 3x^2 \underline{h}$

$\frac{36}{3x^2} = h$

$12x^{-2} = h$

$SA = \underbrace{2x(12x^{-2}) + 2 \cdot 3x(12x^{-2}) + 2 \cdot 3x^2}$

must be 1 variable!

$SA = 24x^{-1} + 72x^{-1} + 6x^2$

- $SA = 96x^{-1} + 6x^2$

- $SA' = -96x^{-2} + 12x$

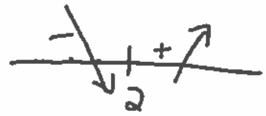
$0 = -96x^{-2} + 12x$

$\frac{96}{x^2} = \frac{12x}{1}$

$12x^3 = 96$

$x^3 = 8$

$x = 2$



rel. min @ $x = 2$

$S.A. = 72\ m^2$

7. $y = \frac{9(x+4)(x-4)}{(x+8)(x+8)}$

$y' = \frac{144(x+2)}{(x+8)^3}$ + − − / − −

-8

$y'' = -\frac{288(x-1)}{(x+8)^4}$

a) V.A. ⇒ $x=-8$ $\lim_{x\to -8^-} f(x) = +\infty$

$\lim_{x\to -8^+} f(x) = +\infty$

b) H.A. ⇒

$\lim_{x\to \pm\infty} \frac{\frac{1}{x^2}(9x^2-144)}{\frac{1}{x^2}(x^2+16x+64)} = \frac{9}{1} = \boxed{9}$

so $\boxed{y=9}$ H.A.

c) x inter. → let $y=0$

$0 = \frac{9(x^2-16)}{(x+8)(x+8)}$

$\boxed{x=4 \ \& \ x=-4}$

y inter → let $x=0$

$y = \frac{-144}{64} = -\frac{9}{4}$ or -2.25

d) + ↗ | − ↘ | + ↗

-8 -2

asymp. at $x=-8$

but rel. min. @ $x=-2$

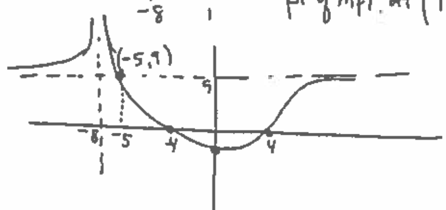
rel min → $(-2, \boxed{-3})$ $\frac{-135}{81}$

e) c.u. c.u. c.d.

+ | + | −

-8 1

pt of infl. at $\left(1, \boxed{\frac{-135}{81}}\right)$



Does graph cross H.A.? If it does this eqn must be solvable.

$\frac{9}{1} = \frac{9x^2-144}{x^2+16x+64}$

$\cancel{9x^2}-144 = \cancel{9x^2}+144x+576$

$\frac{-144-576}{144} = \frac{144x}{144}$

$-\frac{720}{144} = x$

$-5 = x$

CPT – last question (May 15)

Prove: $[f(x)g(x)]' = f(x)g'(x) + f'(x)g(x)$

Let $P(x) = f(x)\cdot g(x)$

find $P'(x)$. Use defn.

$$P'(x) = \lim_{h \to 0} \frac{P(x+h) - P(x)}{h}$$

$$= \lim_{h \to 0} \frac{f(x+h)g(x+h) - f(x)g(x)}{h}$$

$$= \lim_{h \to 0} \frac{f(x+h)g(x+h) - f(x+h)g(x) + f(x+h)g(x) - f(x)g(x)}{h}$$

$$= \lim_{h \to 0} \frac{f(x+h)g(x+h) - f(x+h)g(x)}{h} + \lim_{h \to 0} \frac{f(x+h)g(x) - f(x)g(x)}{h}$$

$$= \lim_{h \to 0} f(x+h)\left[\frac{g(x+h) - g(x)}{h}\right] + \lim_{h \to 0} g(x)\left[\frac{f(x+h) - f(x)}{h}\right]$$

$$= \boxed{f(x)\cdot g'(x) + g(x)f'(x)}$$