

Sheet #3.

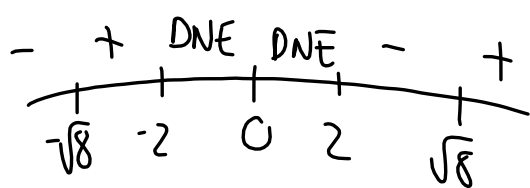
$$y = \frac{x^2}{(x^2-4)^{1/2}} \quad x \neq \pm 2 \quad x < -2, x > 2$$

$$y' = \frac{2x(x^2-4)^{1/2} - x^2 \left(\frac{1}{2} (x^2-4)^{-1/2} (2x) \right)}{(x^2-4)}$$

$$0 = \frac{2x(x^2-4)^{1/2} - x^3(x^2-4)^{-1/2}}{(x^2-4)}$$

$$0 = \frac{x(x^2-4)^{-1/2} [2(x^2-4)^1 - x^2]}{(x^2-4)}$$

$$0 = \frac{x(2x^2-8-x^2)}{(x^2-4)^{1/2}(x^2-4)^1} \rightarrow \frac{x(x^2-8)}{(x^2-4)^{3/2}} = 0$$



$x=0$ $x=+\sqrt{8}$ $x=-\sqrt{8}$ $x=2$ $x=-$
 $\text{max} \text{ ?}$ max max corner cusp
 $\text{min} \circ$ min min cusp cusp
 v.t. v.t.

More CP & IP examples:

ex) $y = 2 \ln|x| - x^2 + 1, x \neq 0$

$$y' = \frac{2}{\ln \cdot |x|} - 2x$$

$$0 = \frac{2}{|x|} - 2x \rightarrow 2x = \frac{2}{|x|} \rightarrow \frac{2x}{2} |x| = \frac{2}{2}$$

$$x|x| = 1$$

$x > 0$ $y' = \frac{2}{x} - 2x \dots$

$x > 0$ $x < 0$
 $x(x) = 1$ $x(-x) = 1$

$x^2 = 1$
 $x = \pm 1$
 $x \neq 0$

$x < 0$ $y' = \frac{2(-1)}{(x)} - 2x \dots$

$x^2 = 1 - x^2 = 1$
 $x = \pm 1$ $x^2 = -1$

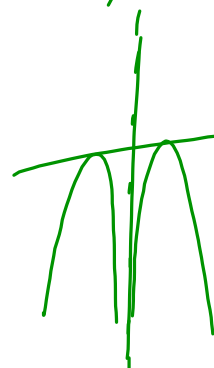
+	-	+	-
+	+	+	+
-	0	1	

$x = \pm 1$ MAX

Inflection points?

Since the function is always concave

down, there are no IP's.



ex) Find the CP & IP for $y = x - 2\cos(x)$, $x \in (0, 2\pi)$

$$\text{max: } \left(\frac{7\pi}{6}, 5\text{ish} \right)$$

$$\text{min: } \left(\frac{11\pi}{6}, 4\text{ish} \right)$$

$$\text{IP: } \left(\frac{\pi}{2}, \frac{\pi}{2} \right)$$

$$\text{IP: } \left(\frac{3\pi}{2}, \frac{3\pi}{2} \right)$$

ex) Find CP & IP for $y = xe^x$

CP: $(-1, -\frac{1}{e})$ max or min

IP: $(-2, -\frac{2}{e^2})$

pg. 184-185
#11-16, 19, 23, 30,
37, 39, 45-48