Thursday

MATH 3A QUIZ 4 (~~TUESDAY~~)

NAME:_____ SECTION (CIRCLE) 1A 1B 1C 1D 1E 1F

1. Determine where the function $y = \sqrt{x^2+1}$ is increasing, decreasing, concave up and concave down.

$$y' = \frac{1}{2\sqrt{x^2+1}} \cdot 2x = \frac{x}{\sqrt{x^2+1}}$$

$y' > 0$ for $x > 0$ $\Rightarrow$ y is increasing for $x > 0$

$y' < 0$ for $x < 0$ $\Rightarrow$ y is decreasing for $x < 0$

$$y'' = \frac{\sqrt{x^2+1} - \frac{1}{2\sqrt{x^2+1}} \cdot 2x \cdot x}{x^2+1} = \frac{1}{(x^2+1)^{3/2}} > 0$$

So, y is concave up everywhere.

2. Find all local and global extrema of the function $y = \cos(x)$ on the interval $[-\pi/3,\ \pi/2]$.

$y' = -\sin x$

$y' = 0 \Rightarrow x = 0$ on $[-\pi/3, \pi/2]$

At $x=0$, y' changes sign from + to −.
Thus, $x=0$ is the point of local maximum

$y(0) = 1$.

Check the endpoints:

$y(-\pi/3) = \cos(-\pi/3) = 1/2$

$y(\pi/2) = \cos \pi/2 = 0$

Thus, $x = \pi/2$ is point of global minimum.

$x = 0$ is the point of global maximum.