

February 5

Evaluate the following trig functions:

$$\sin(\pi/6) = \frac{1}{2}$$

$$\cos(\pi/6) = \frac{\sqrt{3}}{2}$$

$$\sin(\pi/4) = \frac{\sqrt{2}}{2}$$

$$\cos(\pi/4) = \frac{\sqrt{2}}{2}$$

$$\sin(\pi/2) = 1$$

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

$$\tan(\pi/6) = \frac{1}{\sqrt{3}}$$

$$\tan(\pi/4) = 1$$

$$\tan(\pi/2) = \text{undefined}$$

February 5

Students will verbally explain how to  
use limits to find horizontal  
asymptotes

(using the words:  
infinity, crumbs, simplify...)

$x \rightarrow \pm\infty$

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

find all horizontal asymptotes

$$(x \rightarrow \pm \infty)$$

$$\lim_{x \rightarrow \infty} \frac{x+2}{x^2-3x+2} = \frac{\infty+2}{\infty^2-3(\infty)+2} = \frac{\infty}{\infty} \quad \text{indeterminate}$$

$$\lim_{x \rightarrow \infty} \frac{x+2}{x^2-3x+2} \quad \leftarrow \text{Sweep away the crumbs (any term less than the highest exponent)}$$

$$= \lim_{x \rightarrow \infty} \frac{x}{x^2} = \lim_{x \rightarrow \infty} \frac{1}{x} = 0$$

$$\lim_{x \rightarrow -\infty} \frac{x+2}{x^2-3x+2}$$

$$= \lim_{x \rightarrow -\infty} \frac{x}{x^2} = \lim_{x \rightarrow -\infty} \frac{1}{x} = 0$$

H.A. at  $y=0$

$$y = \frac{7x-5x^3}{2x^3-14x^2-16x}$$

find all horizontal asymptotes

$$\lim_{x \rightarrow \infty} \frac{7x-5x^3}{2x^3-14x^2-16x} = \lim_{x \rightarrow \infty} \frac{-5x^3}{2x^3}$$

$$= \lim_{x \rightarrow \infty} \frac{-5}{2} = \frac{-5}{2} = -2.5$$

$$\lim_{x \rightarrow -\infty} \frac{7x-5x^3}{2x^3-14x^2-16x}$$

$$= \lim_{x \rightarrow -\infty} \frac{-5x^3}{2x^3} = \frac{-5}{2}$$

H.A. at  $y = -\frac{5}{2}$

$$y = \frac{7x - 5x^3}{2x^3 - 14x^2 - 16x}$$

find all  
horizontal  
asymptotes

$$\begin{aligned} \lim_{x \rightarrow \infty} \frac{7x - 5x^3}{2x^3 - 14x^2 - 16x} &= \lim_{x \rightarrow \infty} \frac{-5x^3}{2x^3} \\ &= \lim_{x \rightarrow \infty} \frac{-5}{2} = \frac{-5}{2} = -2.5 \end{aligned}$$

$$\begin{aligned} \lim_{x \rightarrow -\infty} \frac{7x - 5x^3}{2x^3 - 14x^2 - 16x} &= \lim_{x \rightarrow -\infty} \frac{-5x^3}{2x^3} = \frac{+5}{-2} \end{aligned}$$

H.A. at  $y = -\frac{5}{2}$  and  $y = \frac{5}{2}$

$$y = e^x$$

find all  
horizontal  
asymptotes

$$\lim_{x \rightarrow \infty} e^x = e^{\infty} = \infty$$

no horizontal asymptote

$$\lim_{x \rightarrow -\infty} e^x = e^{-\infty} = \frac{1}{e^{\infty}} = 0$$

H.A. at  $y = 0$

$$\lim_{x \rightarrow \infty} \frac{4x - 3}{\sqrt{25x^2 + 4x}}$$

$$\lim_{x \rightarrow \infty} \frac{4x - 3}{\sqrt{25x^2 + 4x}}$$

$$= \lim_{x \rightarrow \infty} \frac{4x}{\sqrt{25x^2}}$$

$$= \lim_{x \rightarrow \infty} \frac{4x}{5x} = \frac{4}{5}$$