Name: Richard

September 12, 2012

I'm in the Thurs11 Thurs12 Thurs1 or Fri10 recitation. (Circle one)

MATH 200 – QUIZ 3

1. $\lim_{\theta\to 0} 4\theta\sec(\theta)\csc(\theta) = \lim_{\theta\to 0} 4\theta \frac{1}{\cos(\theta)}\cdot\frac{1}{\sin(\theta)} = \lim_{\theta\to 0} \frac{4}{\cos(\theta)}\frac{\theta}{\sin(\theta)}$

$= \lim_{\theta\to 0} \frac{4}{\cos(\theta)}\frac{1}{\frac{\sin(\theta)}{\theta}} = \frac{4}{\cos(0)}\frac{1}{1} = \frac{4}{1}\cdot\frac{1}{1} = \boxed{4}$

$\sec(\theta) = \frac{1}{\cos(\theta)}$

$\csc(\theta) = \frac{1}{\sin(\theta)}$

$\lim_{\theta\to 0}\frac{\sin(\theta)}{\theta} = 1$

2. $\lim_{x\to 2^+}(x+3)\frac{|x+2|}{x+2} = (2+3)\frac{|2+2|}{2+2} = 5\cdot\frac{4}{4} = \boxed{5}$

The denominator is not approaching 0!

3. State the x-values at which the function $y = \frac{x-1}{x^2+5x-6}$ is discontinuous.

Discontinuous at $x=1$ and $x=-6$

because function is not defined at these values. But otherwise this rational function is continuous on its domain.

$y = \frac{x-1}{(x-1)(x+6)}$

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1. $\lim_{\theta\to 0}\frac{\tan(2\theta)}{\theta} = \lim_{\theta\to 0}\frac{\frac{\sin(2\theta)}{\cos(2\theta)}}{\theta} = \lim_{\theta\to 0}\frac{\sin(2\theta)}{\theta}\frac{1}{\cos(2\theta)} = \lim_{\theta\to 0} 2\frac{\sin(2\theta)}{2\theta}\frac{1}{\cos(2\theta)}$

$= 2\lim_{\theta\to 0}\frac{\sin(2\theta)}{2\theta}\lim_{\theta\to 0}\frac{1}{\cos(2\theta)} = 2\cdot 1\cdot\frac{1}{\cos(0)} = 2\cdot 1\cdot\frac{1}{1} = \boxed{2}$

2. $\lim_{x\to 1^-}\sqrt{2x}\frac{(x-1)}{|x-1|} = \lim_{x\to 1^-}\sqrt{2x}\frac{(x-1)}{-(x-1)} = \lim_{x\to 1^-} -\sqrt{2x} = -\sqrt{2\cdot 1} = \boxed{-\sqrt{2}}$

Note $|x-1| = -(x-1)$ when x is to the left of 1

3. State the x-values at which the function $y = \frac{x+1}{x^2+3x+2}$ is discontinuous.

Discontinuous at $x=-2$ and $x=-1$ because the function is not defined at these values. Otherwise this rational function is continuous on its domain.

$= \frac{x+1}{(x+2)(x+1)}$

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1. $\lim_{\theta\to 0} \frac{\sin(3\theta)}{\theta\cos(2\theta)} = \lim_{\theta\to 0} \frac{\sin(3\theta)}{\theta}\frac{1}{\cos(2\theta)} = \lim_{\theta\to 0} \frac{3\sin(3\theta)}{3\theta}\frac{1}{\cos(2\theta)}$

$= 3\lim_{\theta\to 0}\frac{\sin(3\theta)}{3\theta} \cdot \lim_{\theta\to 0}\frac{1}{\cos(2\theta)} = 3\cdot 1\cdot\frac{1}{1} = \boxed{3}$

2. $\lim_{x\to 1^+} \sqrt{2x}\,\frac{(x-1)}{|x-1|} = \lim_{x\to 1^+}\sqrt{2x}\,\frac{x-1}{x-1} = \lim_{x\to 1^+}\sqrt{2x} = \sqrt{2\cdot 1} = \boxed{\sqrt{2}}$

Note $|x-1| = x-1$ when x is to the right of 1

3. State the x-values at which the function $y = \frac{x-1}{x^2-4x+3}$ is discontinuous.

$= \frac{x-1}{(x-1)(x-3)}$

Discontinuous at $\boxed{x=1 \text{ and } x=3}$ because function is not defined at these values.

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1. $\lim_{\theta\to 0} \frac{1}{5\theta\csc(\theta)\cos(\theta)} = \lim_{\theta\to 0}\frac{1}{5\frac{\theta}{\sin(\theta)}\cos(\theta)} = \lim_{\theta\to 0}\frac{\sin(\theta)}{\theta}\frac{1}{5\cos(\theta)}$

$= \lim_{\theta\to 0}\frac{\sin(\theta)}{\theta}\lim_{\theta\to 0}\frac{1}{5\cos(\theta)} = (1)\left(\frac{1}{5\cdot 1}\right) = \boxed{\frac{1}{5}}$

2. $\lim_{x\to 2^-}(x+3)\frac{|x+2|}{x+2} = \lim_{x\to 2}(x+3)\frac{|x+2|}{x+2} = (2+3)\frac{|2+2|}{2+2} = 5\cdot 1 = \boxed{5}$

The denominator is not approaching 0!

3. State the x-values at which the function $y = \frac{x-1}{x^2-5x+4}$ is discontinuous.

$= \frac{x-1}{(x-1)(x-4)}$

$\boxed{\text{Discontinuous at } x=1 \text{ and } x=4}$ because function is not defined at these values. Otherwise this rational function is continuous on its domain.