Quiz # 8 MATH 1220-005

Instructor: Priscilla Elizondo March 20th, 2013

Name: Key uNID: _____

Points: _____ Grade: _____

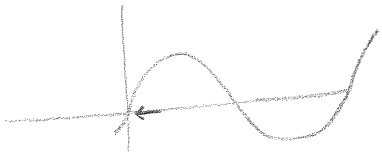
Sections: 8.1, 8.2

Indications: This quiz is individual. Write all the steps showing your work. TOTAL: 20 pts. You have 20 min in order to complete the quiz.

1. Compute the limits. Write the indeterminate form, (e.g $\frac{0}{0}, \frac{\infty}{\infty}, 0\cdot\infty$, ...)

a. $\lim_{x\to 0^+} \frac{x^2}{\sin x - x}$ "$\frac{0}{0}$" (5 pts)

$\overset{L'H}{=} \lim_{x\to 0^+} \frac{2x}{\cos x - 1}$, Again "$\frac{0}{0}$"



$\overset{L'H}{=} \lim_{x\to 0^+} \frac{2}{-\sin x} = \frac{2}{-0^+} = -\infty$

$$\lim_{x\to 0^+} \frac{x^2}{\sin x - x} = -\infty$$

b. $\lim_{t\to 1} \frac{\sqrt{t} - t^2}{\ln t} = \frac{\sqrt{1} - 1^2}{\ln 1} = \frac{0}{0}$ (5 pts)

$\overset{L'H}{=} \lim_{t\to 1} \frac{\frac{1}{2\sqrt{t}} - 2t}{\frac{1}{t}} = \lim_{t\to 1} t\left(\frac{1}{2\sqrt{t}} - 2t\right) = \lim_{t\to 1} \frac{\sqrt{t}}{2} - 2t^2$

$= \frac{1}{2} - 2\cdot 1 = \frac{-3}{2}$

$$\therefore \lim_{t\to 1} \frac{\sqrt{t} - t^2}{\ln t} = \frac{-3}{2}$$

c. $\lim_{x\to\infty} x^{1/x}$ "∞^0" $\lim_{x\to\infty} e^{\ln x^{1/x}}$ (5pts)

$= \lim_{x\to\infty} e^{\frac{1}{x}\ln x} = e^{\lim_{x\to\infty} \frac{1}{x}\ln x} = e^0 = 1$

$\therefore \lim_{x\to\infty} x^{1/x} = 1$

Take the power

- $\lim_{x\to\infty} \frac{1}{x}\ln x = \lim_{x\to\infty} \frac{\ln x}{x} = \frac{"\infty"}{\infty}$

L'H $= \lim_{x\to\infty} \frac{\frac{1}{x}}{1} = \lim_{x\to\infty} \frac{1}{x} = 0$ Now, plug in again

d. $\lim_{x\to 0^+} x\ln(\sin x) = "0\cdot\ln(0)" = "0\cdot-\infty"$ (5pts)

Try to write as "$\frac{0}{0}$" or "$\frac{\infty}{\infty}$"

$\lim_{x\to 0^+} x\ln(\sin x) = \lim_{x\to 0^+} \frac{\ln(\sin x)}{\frac{1}{x}} = \frac{"-\infty"}{\infty}$, Now use L'H

L'H $= \lim_{x\to 0^+} \frac{\frac{1}{\sin x}\cdot\cos x}{\frac{-1}{x^2}} = \lim_{x\to 0^+} -x^2\cdot\frac{\cos x}{\sin x} = \frac{"0"}{0}$, L'H Again

L'H $= \lim_{x\to 0^+} \frac{-2x\cdot\cos x + x^2\sin x}{\cos x} = \frac{0}{1} = 0$

$\therefore \lim_{x\to 0^+} x\ln(\sin x) = 0$

2. Extra Credit:

a. $\lim_{x\to\frac{\pi}{2}} (\sin x)^{\cos x} = (\sin\frac{\pi}{2})^{\cos\pi/2} = 1^0 = 1$ (2.5 pts)

This is not indeterminated.

b. $\lim_{x\to 0^+} (\tan x)^{2/x} = (\tan 0)^{\frac{2}{0}} = 0^\infty = 0$ (2.5 pts)

Not indeterminated.