Name: Richard

MATH 200 – QUIZ 12 ☞

April 9, 2015

1. Use L'Hôpital's rule to find the limits. Please show your work.

(a) $\lim_{x\to 0} \frac{e^x - 1 - x}{x^2} = \lim_{x\to 0} \frac{e^x - 0 - 1}{2x} = \lim_{x\to 0} \frac{e^x}{2} = \frac{e^0}{2} = \boxed{\frac{1}{2}}$

form $\frac{0}{0}$ form $\frac{0}{0}$

(b) $\lim_{x\to\infty} x(e^{1/x} - 1) = \lim_{x\to\infty} \frac{e^{\frac{1}{x}} - 1}{\frac{1}{x}} = \lim_{x\to\infty} \frac{e^{\frac{1}{x}}\left(\frac{-1}{x^2}\right) - 0}{\frac{-1}{x^2}} = \lim_{x\to\infty} e^{\frac{1}{x}}$

form $\infty \cdot 0$ form $\frac{0}{0}$

$= e^0 = \boxed{1}$

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1. Use L'Hôpital's rule to find the limits. Please show your work.

(a) $\lim_{x\to\infty} \frac{\ln x}{\sqrt{x}} = \lim_{x\to\infty} \frac{\frac{1}{x}}{\frac{1}{2}x^{-\frac{1}{2}}} = \lim_{x\to\infty} \frac{\frac{1}{x}}{\frac{1}{2x^{1/2}}} = \lim_{x\to\infty} \frac{1}{x} \cdot \frac{2x^{\frac{1}{2}}}{1}$

form $\frac{\infty}{\infty}$

$= \lim_{x\to\infty} 2x^{\frac{1}{2}-1} = \lim_{x\to\infty} 2x^{-\frac{1}{2}} = \lim_{x\to\infty} \frac{2}{\sqrt{x}} = \boxed{0}$

(b) $\lim_{x\to 0} x\csc(x) = \lim_{x\to 0} \frac{x}{\frac{1}{\csc(x)}} = \lim_{x\to 0} \frac{x}{\sin(x)} = \lim_{x\to 0} \frac{1}{\cos(x)}$

form $0 \cdot \infty$ form $\frac{0}{0}$

$= \frac{1}{\cos(0)} = \frac{1}{1} = \boxed{1}$