MAC 2311 Section 3137 **Name:** Solutions

Quiz 2 (Lectures 6,7,8)

Be sure to show your work for full credit!

1. Evaluate the following limit.

$$\lim_{x\to 0} \frac{\sqrt{3}-\sqrt{x+3}}{x} = \frac{\sqrt{3}-\sqrt{0+3}}{0} = \frac{0-0}{0} = \frac{0}{0}$$

indeterminate form

$$\lim_{x\to 0} \frac{\sqrt{3}-\sqrt{x+3}}{x} \cdot \frac{\sqrt{3}+\sqrt{x+3}}{\sqrt{3}+\sqrt{x+3}}$$

$$= \lim_{x\to 0} \frac{3-(x+3)}{x(\sqrt{3}+\sqrt{x+3})} = \lim_{x\to 0} \frac{3-x-3}{x(\sqrt{3}+\sqrt{x+3})} = \lim_{x\to 0} \frac{-x}{x(\sqrt{3}+\sqrt{x+3})}$$

$$= \lim_{x\to 0} \frac{-1}{\sqrt{3}+\sqrt{x+3}} = \frac{-1}{\sqrt{3}+\sqrt{0+3}} = \boxed{\frac{-1}{2\sqrt{3}}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{-\sqrt{3}}{2\cdot 3} = \frac{-\sqrt{3}}{6}$$

2. Find the set of points at which the function is continuous.

$$f(x) = \frac{1}{\ln(\ln(x))}$$

Must have:

$\ln(\ln(x)) \neq 0$, $\ln(x) > 0$, and $\boxed{x > 0}$

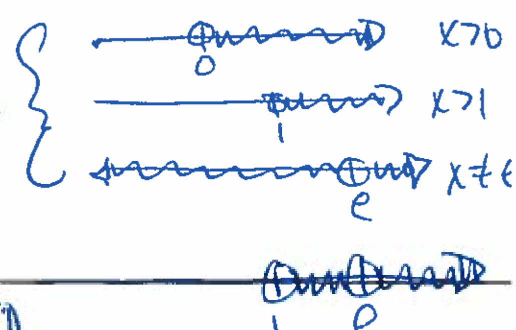
Solve for x:

$e^{\ln(\ln(x))} \neq e^0 = 1$ $\qquad$ $e^{\ln(x)} > e^0 = 1$

$\ln(x) \neq 1$ $\qquad$ $\boxed{x > 1}$

$e^{\ln(x)} \neq e^1$

$\boxed{x \neq e}$



These intervals intersect at:

Answer: $\boxed{(1, e) \cup (e, \infty)}$

3. Find the limit

$$\lim_{x\to\infty} \frac{2e^{2x} - e^{-2x} + 5}{-3e^{2x} + e^{-2x} - 4}$$

Divide every term by e^{2x}:

$$= \lim_{x\to\infty} \frac{\frac{2e^{2x}}{e^{2x}} - \frac{e^{-2x}}{e^{2x}} + \frac{5}{e^{2x}}}{\frac{-3e^{2x}}{e^{2x}} + \frac{e^{-2x}}{e^{2x}} - \frac{4}{e^{2x}}}$$

$$= \lim_{x\to\infty} \frac{2 - e^{-2x-2x} + \frac{5}{e^{2x}}}{-3 + e^{-2x-2x} - \frac{4}{e^{2x}}}$$

$$= \lim_{x\to\infty} \frac{2 - \frac{1}{e^{4x}} + \frac{5}{e^{2x}}}{-3 + \frac{1}{e^{4x}} - \frac{4}{e^{2x}}}$$

$$= \frac{2 - \frac{1}{e^{\infty}} + \frac{5}{e^{\infty}}}{-3 + \frac{1}{e^{\infty}} - \frac{4}{e^{\infty}}}$$

$$= \frac{2 - 0 + 0}{-3 + 0 - 0}$$

$$= \boxed{-\frac{2}{3}}$$