Math 221 Sec 003 Quiz 2

Name:_____

You are to complete these questions in 15 minutes. No notes, calculators, or any other electronic devices are allowed.

Please show all working.

1. Find the following limit:

$$\lim_{x\to 8} \sqrt{x+1} - \sqrt[3]{x}$$

Solution:

$$\begin{aligned} \lim_{x\to 8} \sqrt{x+1} - \sqrt[3]{x} &= \sqrt{8+1} - \sqrt[3]{8} && \text{(direct substitution +1)} \\ &= 1 && \text{(correct answer +1)} \end{aligned}$$

2. Find the following limit:

$$\lim_{x\to 2} \frac{2x-4}{x-2}$$

Solution:

$$\begin{aligned} \lim_{x\to 2} \frac{2x-4}{x-2} &= \lim_{x\to 2} \frac{2(x-2)}{x-2} \\ &= \lim_{x\to 2} 2 \\ &= 2 && \text{(cancellation +1, correct answer +1)} \end{aligned}$$

3. Find the following limit:

$$\lim_{x\to 2^+} \frac{4-x^2}{|2-x|}$$

Solution:

If $x > 2$, $2 - x < 0$.

$$\begin{aligned} \lim_{x\to 2^+} \frac{4-x^2}{|2-x|} &= \lim_{x\to 2^+} \frac{4-x^2}{-(2-x)} && \text{(negative +1)} \\ &= \lim_{x\to 2^+} \frac{(2-x)(2+x)}{-(2-x)} \\ &= \lim_{x\to 2^+} -(2+x) && \text{(cancellation +1)} \\ &= -4 && \text{(correct answer +1)} \end{aligned}$$

4. Find the following limit:

$$\lim_{x\to -3} \frac{\sqrt{x^2-5}-2}{x+3}$$

Solution:

$$\begin{aligned}
\lim_{x\to -3} \frac{\sqrt{x^2-5}-2}{x+3} &= \lim_{x\to -3} \frac{(\sqrt{x^2-5}-2)(\sqrt{x^2-5}+2)}{(x+3)(\sqrt{x^2-5}+2)} && \text{(conjugate +1)} \\
&= \lim_{x\to -3} \frac{x^2-9}{(x+3)(\sqrt{x^2-5}+2)} \\
&= \lim_{x\to -3} \frac{(x+3)(x-3)}{(x+3)(\sqrt{x^2-5}+2)} \\
&= \lim_{x\to -3} \frac{x-3}{\sqrt{x^2-5}+2} && \text{(cancellation +1)} \\
&= \frac{-6}{4} \\
&= -\frac{3}{2} && \text{(correct answer +1)}
\end{aligned}$$