

Math 171 - Quiz 3

September 6, 2012

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary. Do not use your calculator for any part of this quiz.

1. (2 points) Evaluate the limit: $\lim_{x \rightarrow 3} \frac{x^2 - 8x + 15}{x^2 - 9}$ $\frac{0}{0}$ INDET FORM

$$\lim_{x \rightarrow 3} \frac{\cancel{(x-3)}(x-5)}{\cancel{(x-3)}(x+3)} = \frac{-2}{6} = \boxed{-\frac{1}{3}}$$

2. (2 points) Evaluate the limit: $\lim_{x \rightarrow 2} \frac{x-2}{x-\sqrt{x+2}}$ $\frac{0}{0}$ INDET FORM

$$\lim_{x \rightarrow 2} \frac{x-2}{x-\sqrt{x+2}} \cdot \frac{x+\sqrt{x+2}}{x+\sqrt{x+2}} = \lim_{x \rightarrow 2} \frac{(x-2)(x+\sqrt{x+2})}{\underbrace{x^2-x-2}_{(x-2)(x+1)}} = \lim_{x \rightarrow 2} \frac{x+\sqrt{x+2}}{x+1} = \boxed{\frac{4}{3}}$$

3. (2 points) Evaluate the limit: $\lim_{x \rightarrow 5} \frac{10}{x+5} - \frac{10}{x}$

$$= \frac{1-2}{25} = \boxed{-\frac{1}{25}}$$

4. (2 points) Evaluate the limit: $\lim_{x \rightarrow 0} \frac{\sin x}{5x(3+\cos x)}$

$$= \lim_{x \rightarrow 0} \frac{1}{5} \frac{\sin x}{x} \frac{1}{3+\cos x} = \frac{1}{5} (1) \left(\frac{1}{4}\right) = \boxed{\frac{1}{20}}$$

5. (2 points) After using direct substitution to evaluate the following limit

$$\lim_{x \rightarrow -2} \frac{(3+x)^2 - 1}{x+2}$$

Steve concluded that the limit does not exist. What is wrong with Steve's approach? What should he have done?

STEVE GOT THE INDETERMINATE FORM $\frac{0}{0}$, FROM WHICH HE SHOULD HAVE CONCLUDED NOTHING.

HE SHOULD HAVE EXPANDED AND SIMPLIFIED, AND THEN RESUBSTITUTED:

$$\lim_{x \rightarrow -2} \frac{9+6x+x^2-1}{x+2} = \lim_{x \rightarrow -2} \frac{(x+2)(x+4)}{x+2} = 2$$