Math 157 - Quiz 2

Name key

September 3, 2014

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) Use a table of values to estimate the following limit. Your table must show functions values at six or more points.

$$\lim_{x\to 9} \frac{x^2-8x-9}{\sqrt{x}-3}$$

x	$\frac{x^2-8x-9}{\sqrt{x}-3}$
8.9	59.2345
8.99	59.9233
8.999	59.9923
8.9999	59.9992
9.001	60.0077
9.0001	60.0008

IT LOOKS LIKE

$$\lim_{x\to 9} \frac{x^2-8x-9}{\sqrt{x}-3} = \boxed{60.}$$

2. (3 points) Use algebra to find the limit analytically.

$$\lim_{x\to -5} \frac{x^2+7x+10}{x+5}$$

$$\lim_{x\to -5} \frac{(x+5)(x+2)}{(x+5)} = \lim_{x\to -5} (x+2) = \boxed{-3}$$

3. (4 points) Pregnant women metabolize some drugs at a slower rate than the rest of the population. The half-life of caffeine is about 4 hours for most people. In pregnant women, it is 10 hours. If a pregnant women and her husband each have a cup of coffee containing 100 mg of caffeine at 8 am, how much caffeine does each have left in the body at 10 pm?

HUSBAND:

$P(t) = 100e^{kt}$

$\frac{1}{2}$ LIFE $= 4$ HRS

$\Rightarrow \frac{1}{2}P_0 = P_0 e^{4k}$

$\frac{1}{2} = e^{4k}$

$\frac{\ln \frac{1}{2}}{4} = k$

$P(t) = 100e^{\frac{\ln \frac{1}{2}}{4}t}$

AT 10pm, $t = 14$

$P(14) = 100e^{\frac{\ln \frac{1}{2}}{4}(14)}$

$\approx$ **8.84 mg**

PREGNANT WOMAN:

$P(t) = 100e^{kt}$

$\frac{1}{2}$ LIFE $= 10$ HRS

$\Rightarrow \frac{1}{2}P_0 = P_0 e^{10k}$

$\frac{1}{2} = e^{10k}$

$\frac{\ln \frac{1}{2}}{10} = k$

$P(t) = 100e^{\frac{\ln \frac{1}{2}}{10}t}$

$P(14) = 100e^{\frac{\ln \frac{1}{2}}{10}(14)}$

$\approx$ **37.89 mg**