Quiz #1 Math 1131 September 3, 2014

Name: Key Section: _____

You have 10 minutes to complete the quiz. Please **show all work**, and then **circle your answer.**

5pts

1. Suppose that an outbreak of a mysterious new disease in Waterbury grows at a rate proportional to its size. Suppose also that the outbreak begins with 2 sick people around the downtown mall, and that 6 people are sick after 3 days have passed.

exp growth

P_0

$P(3)$

Find an equation for the population as a function of t in days since the outbreak began.

$P(t) = P_0 \cdot e^{kt}$

$P(t) = 2 \cdot e^{kt}$ (1pt)

Know $6 = P(3) = 2 \cdot e^{k \cdot 3}$

$3 = e^{k \cdot 3}$ (2pt)

$\ln(3) = k \cdot 3 \Rightarrow k = \frac{\ln(3)}{3}$

(2pt)

$P(t) = 2 \cdot e^{\left(\frac{\ln(3)}{3}\right)t}$

$= 2 \cdot \left(e^{\ln(3)}\right)^{\frac{t}{3}}$

$= 2 \cdot \left(\sqrt[3]{3}\right)^{t}$

2pts

2. Find functions $f(x)$ and $g(x)$ such that $(f \circ g)(x) = (x+4)^2$.

$(f \circ g)(x) = f(g(x))$ (1pt each)

$f(x) = x^2, \quad g(x) = x+4$

3pts

3. Solve for x satisfying the equation

$$e^{2x+1} = 6e^{x+3}$$

Two ways to solve

$\ln\left(e^{2x+1}\right) = \ln\left(6 \cdot e^{x+3}\right)$

$2x+1 = \ln(6) + \ln\left(e^{x+3}\right)$ (2pt)

$2x+1 = \ln(6) + x + 3$

$x = \ln(6) + 2$ (1pt)

$\frac{e^{2x+1}}{e^{x+3}} = 6$ (1pt)

$e^{(2x+1)-(x+3)} = 6$ (1pt)

$e^{x-2} = 6$

$x - 2 = \ln(6)$

$x = \ln(6) + 2$ (1pt)