Math 220 (section AD?) **Quiz 2** **Spring 2015**

Name Solutions

- You have 15 minutes
- No calculators
- Show sufficient work

1. (1 point) Simplify the following quantity.

$e^{-4\ln\left(\sqrt{5}\right)}$ $= \dfrac{1}{e^{4\ln(\sqrt{5})}}$

$= \dfrac{1}{e^{\ln((\sqrt{5})^4)}}$

$= \dfrac{1}{(\sqrt{5})^4} = \dfrac{1}{25}$

2. (3 points) Determine all values of x which satisfy the equation below.

$\ln\left(\dfrac{4x+3}{9-5x}\right) = 2$

$e^{\ln\left(\frac{4x+3}{9-5x}\right)} = e^2$

$\dfrac{4x+3}{9-5x} = e^2$

$4x+3 = e^2(9-5x)$

$4x+3 = 9e^2-5e^2x$

$4x+5e^2x = 9e^2-3$

$x(4+5e^2) = 9e^2-3$

$x = \dfrac{9e^2-3}{4+5e^2}$

3. (3 points) Given that $g(t) = \sqrt[5]{3 + 2e^{t-4}}$, find a formula for $g^{-1}(t)$.

$$y = \sqrt[5]{3+2e^{t-4}}$$

$$t = \sqrt[5]{3+2e^{y-4}}$$

$$t^5 = 3 + 2e^{y-4}$$

$$t^5 - 3 = 2e^{y-4}$$

$$\frac{t^5-3}{2} = e^{y-4}$$

$$\ln\left(\frac{t^5-3}{2}\right) = \ln(e^{y-4})$$

$$\ln\left(\frac{t^5-3}{2}\right) = y-4$$

$$y = 4 + \ln\left(\frac{t^5-3}{2}\right)$$

$$g^{-1}(t) = 4 + \ln\left(\frac{t^5-3}{2}\right)$$

4. (3 points) Determine the formula for an exponential function given that its graph goes through the points $(3, 54)$ and $(9, 24)$.

$$\boxed{y = C \cdot a^x}$$

At $(x,y) = (3,54)$ we have $54 = C \cdot a^3 \Rightarrow C = \frac{54}{a^3}$

At $(x,y) = (9,24)$ we have $24 = C \cdot a^9$

Thus $24 = \frac{54}{a^3} \cdot a^9$

$$\frac{24}{54} = a^6 \Rightarrow a = \left(\frac{24}{54}\right)^{1/6} = \left(\frac{4}{9}\right)^{1/6} = \left(\frac{2}{3}\right)^{1/3}$$

$$C = \frac{54}{a^3} = \frac{54}{\left(\left(\frac{2}{3}\right)^{1/3}\right)^3} = \frac{54}{2/3} = 81$$

$$y = 81 \cdot \left(\left(\frac{2}{3}\right)^{1/3}\right)^x$$

$$y = 81 \cdot \left(\frac{2}{3}\right)^{x/3}$$