Math 1411 Quiz 11 Name KEY

You may use a calculator and your homework, but not your books or notes. There are three (3) problems worth 5 points each. **Show all of your work to receive full/partial credit.**

1) (#70 from 5.5) Use logarithmic differentiation to find dy/dx.

$$y = (1+x)^{1/x}$$

$$\ln y = \ln(1+x)^{1/x} \rightarrow \ln y = \frac{1}{x}\ln(1+x)$$

differentiate both sides with respect to x:

$$\frac{y'}{y} = -x^{-2}\ln(1+x) + x^{-1}\left(\frac{1}{x+1}\right)$$

$$y' = y\left[-\frac{\ln(1+x)}{x^2} + \frac{1}{x(x+1)}\right]$$

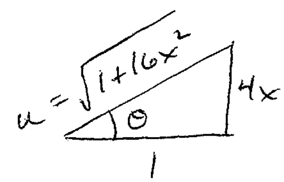
$$y' = (1+x)^{1/x}\left[-\frac{\ln(1+x)}{x^2} + \frac{1}{x^2+x}\right]$$

2) (#28 from 5.6) Write the expression in algebraic form.

$$\sec(arctan\, 4x)$$

Let $\theta = \arctan 4x$

Draw θ:



$u^2 = (4x)^2 + (1)^2$

$u = \sqrt{16x^2+1}$

$\sec(\arctan 4x) = \sec\theta = \sqrt{1+16x^2}$

3) (#112 from 5.4) Find the indefinite integral.

$$\int \frac{2e^x - 2e^{-x}}{(e^x + e^{-x})^2}\,dx$$ should be squared

let $u = e^x + e^{-x}$, $du = e^x - e^{-x}\,dx$, $2du = 2e^x - 2e^{-x}\,dx$

Integral becomes

$$2\int \frac{du}{u^2} = 2\int u^{-2}\,du = -2u^{-1} + C$$

$$= 2(e^x+e^{-x})^{-1} + C = \frac{2}{e^x+e^{-x}} + C$$