142 Fall 01 Exam

PRINT Your Name:_____

There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. CIRCLE your answer. **NO CALCULATORS! CHECK** your answer whenever possible.

1. Find $\int \frac{e^x}{e^x+1}dx$. Check your answer.

Let $u = e^x + 1$

$du = e^x\,dx$

integral $= \int \frac{du}{u} = \ln|u| + C$

$= \ln(e^x+1) + C$

Check $\frac{d}{dx}\ln(e^x+1) = \frac{e^x}{e^x+1}$ ✓

2. Find $\int \frac{2^x}{\sqrt{2^x+1}}dx$. Check your answer.

$u = 2^x + 1$

$du = (\ln 2)2^x\,dx$

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

$= \frac{2}{\ln 2}\sqrt{2^x+1} + C$

Ch $\frac{d}{dx}\left(\frac{2}{\ln 2}(2^x+1)^{\frac{1}{2}}\right)$

$= \frac{2}{\ln 2}\cdot\frac{1}{2}(2^x+1)^{-\frac{1}{2}}\ln 2$ ✓

3. If $y = x^x$, then find $\frac{dy}{dx}$

$\ln y = x\ln x$

$\frac{1}{y}\frac{dy}{dx} = x\cdot\frac{1}{x} + \ln x$

$\frac{dy}{dx} = y(1+\ln x)$

$\frac{dy}{dx} = x^x(1+\ln x)$