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# MATH 1432 - QUIZ 2

Show your work to get proper credit.

**(1)[3 Pts]** Calculate the following indefinite integral

$\int \frac{e^x}{\sqrt{e^x+1}}dx$

By u-substitution,

let $u = e^x+1$. $du = e^x dx$.

$\int \frac{du}{\sqrt{u}} = 2u^{\frac{1}{2}} + C = 2(e^x+1)^{\frac{1}{2}} + C$

**(2)[3 Pts]** Differentiate the function $f(x) = 5^{-2x^2+x} \cdot \cos(4x^3)$.

By Chain Rule $f'(x) = \left(5^{-2x^2+x}\right)' \cos(4x^3) + 5^{-2x^2+x} \cdot (\cos(4x^3))'$

$= \ln 5 \cdot (-2x^2+x)' \cdot 5^{-2x^2+x} \cos(4x^3) + 5^{-2x^2+x} \cdot (-\sin(4x^3)) \cdot 12x^2$

$= (-4x+1)\ln 5 \cdot 5^{-2x^2+x} \cos(4x^3) + 12x^2 \cdot 5^{-2x^2+x}(-\sin(4x^3))$

**(3)[4 Pts]** Find the derivative by logarithmic differentiation:

$\frac{d}{dx}[x^{\sin(x)}]$

let $g(x) = x^{\sin(x)}$. $\ln g(x) = \sin(x)\ln x$

diff. Product Rule

$\frac{g'(x)}{g(x)} = \cos(x)\cdot\ln x + \frac{\sin(x)}{x} \Rightarrow g'(x) = x^{\sin(x)}\left[\cos(x)\cdot\ln x + \frac{\sin(x)}{x}\right]$