MATH 1712 D1-D3 **Quiz #3** **Full Name** Key *(Print)*

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Circle your TA's name: D1 – Lacy Hardcastle D2 – Kyla Adams D3 – Kelly Robinson

1. Solve each equation for x.

(a) $8^x = \left(\frac{1}{2}\right)^{x+3}$ *(7 pts.)*

$\left(2^3\right)^x = \left(2^{-1}\right)^{x+3}$

$2^{3x} = 2^{-x-3}$

$3x = -x - 3$

$4x = -3$

$x = -\frac{3}{4}$

(b) $2e^{-2x} - 5 = 0$ *(7 pts.)*

$2e^{-2x} = 5$

$e^{-2x} = \frac{5}{2}$

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

$-2x = \ln\left(\frac{5}{2}\right)$

$x = -\frac{1}{2}\ln\left(\frac{5}{2}\right)$

2. Find the derivative of $f(x) = e^{x^2+2x+6}$. *(7 pts.)*

$f'(x) = \left(e^{x^2+2x+6}\right)\left(x^2+2x+6\right)'$

$= e^{x^2+2x+6}(2x+2)$

$= (2x+2)e^{x^2+2x+6}$

3. Let $y = (2-x)^{(2x+1)}$. Find $\frac{dy}{dx}$. *(10 pts.)* Use the logarithmic differentiation method.

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

$\ln y = (2x+1)\ln(2-x)$

$\frac{1}{y}\frac{dy}{dx} = \left(\frac{d}{dx}(2x+1)\right)\ln(2-x) + (2x+1)\frac{d}{dx}\left(\ln(2-x)\right)$

$\frac{1}{y}\frac{dy}{dx} = 2\ln(2-x) + (2x+1)\frac{1}{2-x}\cdot(-1)$

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

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

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4. An amount of $2,000 is deposited in a bank that pays interest at the rate of 2.56% per year, compounded annually. What is the accumulated amount (the balance) at the end of 6 years? Leave the answer in the form that is ready for a calculator.

$m = 1$ annually

$A(t) = P\left(1 + \frac{r}{m}\right)^{mt}$

$A(t) = 2000\left(1 + \frac{.0256}{1}\right)^{1 \cdot t}$

$A(6) = 2000(1.0256)^6$ dollars

(6 pts.)

5. Find each indefinite integral.

(a) $\int x^2 + \frac{1}{x^2} + 2^x \, dx$

$= \int x^2 + x^{-2} + 2^x \, dx$

$= \frac{x^3}{3} + \frac{x^{-1}}{-1} + \frac{2^x}{\ln 2} + C$

(6 pts.)

(b) $\int \frac{3}{2x+1} \, dx$ Use the substitution method.

Let $u = 2x + 1$

$\frac{du}{dx} = 2$

$\frac{du}{2} = dx$

$\int \frac{3}{2x+1} \, dx = \int \frac{3}{u} \frac{du}{2}$

$= \frac{3}{2} \int \frac{1}{u} \, du$

$= \frac{3}{2} \ln|u| + C$

$= \frac{3}{2} \ln|2x+1| + C$

(8 pts.)

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4. An amount of deposited in a bank that pays interest at the rate of 2.56% per year, c0mp0m1dec(a1/muilly:>What is the accumulated amount (the balance) at the end of 6 years?

M.