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Calculus 1432

Quiz 2

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1 point per answer

1. $\frac{d}{dx} \ln x^2 = \frac{d}{dx} (2 \ln x) = \frac{2}{x}$

2. $\frac{d}{dx} e^x = e^x$

3. $\int \sec x \, dx = \ln |\sec x + \tan x| + C$

4. $\frac{d}{dx} 4^{x^3} = 4^{x^3} \cdot 3x^2 \cdot \ln 4$

Let $f(x) = 4^{x^3} \Rightarrow \ln f(x) = x^3 \ln 4$
 $\frac{d}{dx} \frac{f(x)}{f(x)} = 3x^2 \ln 4 \Rightarrow f'(x) = 4^{x^3} \cdot 3x^2 \cdot \ln 4$

6. $\int \frac{\ln x}{x} \, dx = \frac{(\ln x)^2}{2} + C$

Let $u = \ln x, du = \frac{dx}{x}$
 $\int u \, du = \frac{u^2}{2} + C$

8. $\frac{d}{dx} x^{(x^5-2x)} =$

Let $f(x) = x^{(x^5-2x)}, \ln f(x) = (x^5-2x) \ln x$

$\frac{d}{dx} \frac{f(x)}{f(x)} = (5x^4-2) \ln x + \frac{x^5-2x}{x} \Rightarrow f'(x) = [(5x^4-2) \ln x + (x^4-2)] x^{(x^5-2x)}$

9. $\int \frac{x^2-1}{x^3-3x+1} \, dx = \frac{1}{3} \ln |x^3-3x+1| + C$

Let $u = x^3-3x+1, du = 3x^2-3 \, dx = 3(x^2-1) \, dx$

$\frac{1}{3} \int \frac{du}{u} = \frac{1}{3} \ln |u| + C$

10. $\int \frac{1}{\sin x} \, dx = \int \csc x \, dx = \ln |\csc x - \cot x| + C$

Note.

• From 6. $(\ln x)^2 \neq \ln x^2$

• From 4. $\frac{d}{dx} 4^{x^3} = \frac{d}{dx} e^{\ln 4^{x^3}}$
 $= \frac{d}{dx} e^{x^3 \cdot \ln 4} = 3x^2 \cdot \ln 4 \cdot e^{x^3 \cdot \ln 4}$
 $= 3x^2 \cdot \ln 4 \cdot 4^{x^3}$

$\frac{1}{2} \ln(x^2+1) + C$
 $\uparrow \text{since } x^2+1 > 0$

5. $\int \frac{x}{x^2+1} \, dx = \frac{1}{2} \ln |x^2+1| + C$

Let $u = x^2+1, du = 2x \, dx$
 $\frac{1}{2} \int \frac{du}{u} = \frac{1}{2} \ln |u| + C = \frac{1}{2} \ln |x^2+1| + C$

7. $\int \cot x \, dx = \ln |\sin x| + C$ or $-\ln |\csc x| + C$