

Name: Solutions

Section: 11 12 13

1. Differentiate the function $g(t) = \ln(3x^2 + 1)$.

$$g'(t) = \frac{1}{3x^2 + 1} \cdot [6x]$$

2. Evaluate the integral $\int \cos x e^{\sin x} dx$.

u-sub

$$u = \sin x$$

$$du = \cos x dx$$

$$\int e^u du$$

$$= e^u + C$$

$$= e^{\sin x} + C$$

3. Differentiate $y = (\cos x)^x$.

Logarithmic differentiation

$$\ln y = \ln((\cos x)^x) = x \cdot \ln(\cos x)$$

$$\Rightarrow \frac{y'}{y} = 1 \cdot \ln(\cos x) + x \cdot \frac{1}{\cos x} \cdot (-\sin x)$$

$$\Rightarrow y' = (\cos x)^x \left[\ln(\cos x) - x \cdot \tan x \right]$$