

## Calculus Worksheet #1 Unit 10 Selected Solutions

Find  $dy/dx$  for each of the following functions.

3.  $y = e^{\sin x}$

$$y = e^u \Rightarrow dy/dx = e^u (du/dx)$$

$$dy/dx = e^{\sin x} (\cos x)$$

$$dy/dx = (\cos x)e^{\sin x}$$

4.  $y = 3^{\sec x}$

$$y = a^u \Rightarrow dy/dx = (\ln a) a^u (du/dx)$$

$$dy/dx = (\ln 3) 3^{\sec x} (\sec x \tan x)$$

$$dy/dx = (\ln 3)(\sec x \tan x) 3^{\sec x}$$

9.  $y = x e^x$

(product rule)

$$dy/dx = x e^x + e^x (1)$$

$$dy/dx = x e^x + e^x$$

10.  $y = e^x \tan x$

(product rule)

$$dy/dx = e^x (\sec^2 x) + (\tan x) e^x$$

$$dy/dx = e^x (\sec^2 x + \tan x)$$

Integrate each of the following.

17.  $\int \csc^2(3x) e^{\cot(3x)} dx =$

$$\int e^u du = e^u + C$$

$$= \frac{1}{3} \int e^{\cot(3x)} [3 \csc^2(3x) dx] =$$

$$= \frac{1}{3} e^{\cot(3x)} + C$$

18.  $\int e^{2x} \cos(e^{2x}) dx =$

$$\int \cos u du = \sin u + C$$

$$= \frac{1}{2} \int \cos(e^{2x}) [2e^{2x} dx] =$$

$$= \frac{1}{2} \sin(e^{2x}) + C$$

23.  $\int \cos x e^{\sin x} dx =$

$$\int e^u du = e^u + C$$

$$= \int e^{\sin x} [\cos x dx] =$$

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

24.  $\int 2^x \sin(2^x) dx =$

$$\int \sin u du = -\cos u + C$$

$$= \frac{1}{\ln 2} \int \sin(2^x) [(\ln 2) 2^x dx] =$$

$$= \frac{-1}{\ln 2} \cos(2^x) + C$$