

p. 178 #20 find  $\frac{dy}{dx}$

$$y = x \cdot \ln x - x$$

$$u = x \quad v = \ln x$$

$$u' = 1$$

$$v' = \frac{1}{x}$$

$$\frac{dy}{dx} = \ln x + 1 - 1$$

$$= \ln x$$

p. 181 #10

$$r = \tan^2(3 - \theta^2)$$

find  $r'$ , or  $\frac{dr}{d\theta}$

$$r = (\tan(3 - \theta^2))^2$$

$$r' = 2 \tan(3 - \theta^2) \cdot \sec^2(3 - \theta^2) \cdot (-2\theta)$$

$$\#11 \quad y = x^2 \csc 5x$$

$$u = x^2$$

$$y = x^2 \cdot \csc(5x)$$

$$u' = 2x \quad y' = 2x \csc 5x + x^2 \cdot (-5 \csc 5x \cot 5x)$$

$$v = \csc(5x) \quad = 2x \csc 5x - 5x^2 \csc 5x \cot 5x$$

$$v' = -\csc(5x) \cot(5x) \cdot 5$$

$$= -5 \csc(5x) \cot(5x)$$

$$\#21 \quad y = x^{\ln x}$$

$$y = (e^{\ln x})^{\ln x} \quad \leftarrow \quad \boxed{x = e^{\ln x}}$$

$$y = e^{\ln^2 x}$$

$$y = e^{(\ln x)^2}$$

$$y' = e^{(\ln x)^2} \cdot 2 \ln x \cdot \frac{1}{x}$$

$$= x^{\ln x} \cdot 2 \ln x \cdot \frac{1}{x}$$

$$= x^{\ln x - 1} \cdot 2 \ln x$$