

Sec. 3.7 cont.

p. 175 # 17-20, 29, 30

$$\textcircled{17} \quad y = \cos^4 \theta = (\cos \theta)^4 \quad u = \cos \theta \quad y = u^4$$
$$\frac{du}{d\theta} = -\sin \theta \quad \frac{dy}{du} = 4u^3$$

$$y' = 4u^3 \cdot -\sin \theta = \boxed{-4 \sin \theta \cos^3 \theta}$$

$$\textcircled{18} \quad y = \cos(9\theta + 41) \quad u = 9\theta + 41 \quad y = \cos u$$
$$\frac{du}{d\theta} = 9 \quad \frac{dy}{du} = -\sin u$$

$$y' = -\sin u \cdot 9 = \boxed{-9 \sin(9\theta + 41)}$$

$$\textcircled{19} \quad y = (2 \cos \theta + 5 \sin \theta)^9 \quad u = 2 \cos \theta + 5 \sin \theta \quad y = u^9$$
$$\frac{du}{d\theta} = 2(-\sin \theta) + 5 \cos \theta \quad \frac{dy}{du} = 9u^8$$

$$y' = 9u^8 (-2 \sin \theta + 5 \cos \theta)$$

$$= \boxed{9(-2 \sin \theta + 5 \cos \theta)(2 \cos \theta + 5 \sin \theta)^8}$$

$$\textcircled{20} \quad y = \sqrt{9 + x + \sin x} \quad u = 9 + x + \sin x \quad y = \sqrt{u}$$
$$\frac{du}{dx} = 1 + \cos x \quad \frac{dy}{du} = \frac{1}{2\sqrt{u}}$$

$$y' = \frac{1}{2\sqrt{u}} \cdot 1 + \cos x = \boxed{\frac{1 + \cos x}{2\sqrt{9 + x + \sin x}}}$$

$$(29) y = \sin(x^2)$$

$$u = x^2$$
$$\frac{du}{dx} = 2x$$

$$y = \sin u$$
$$\frac{dy}{du} = \cos u$$

$$y' = \cos u \cdot 2x = \boxed{2x \cos x^2}$$

$$(30) y = \sin^2 x = (\sin x)^2$$

$$u = \sin x$$
$$\frac{du}{dx} = \cos x$$

$$y = u^2$$
$$\frac{dy}{du} = 2u$$

$$y' = 2u \cos x = \boxed{2 \sin x \cos x}$$