

$$1. (a) \frac{3e^{\sin(\pi x)} - 3xe^{\sin(\pi x)} \cdot \pi \cos(\pi x)}{(e^{\sin(\pi x)})^2}$$

$$(b) x^{2^x} \cdot \left(\frac{2^x}{x} + \ln 2 \cdot \ln x \cdot 2^x \right)$$

$$(c) \frac{1}{x} \sqrt{x^{2k} + 3} + \ln(kx) \cdot \frac{k \cdot x^{2k-1}}{\sqrt{x^{2k} + 3}}$$

$$2. (a) -4 \quad (b) 5 \quad (c) \frac{2}{5}$$

$$3. (a) (5, 6) \quad (b) \frac{1}{2} \quad (c) 0 \quad (d) 2 \quad (e) 0 \quad (f) \infty \text{ or undefined}$$

$$4. \frac{30}{\sqrt{3}} \approx 17.3 \text{ feet}$$

$$5. (a) t = \frac{2}{3} \quad (b) 1.4 \text{ seconds}$$

$$6. (a) \frac{dx}{d\theta} = \frac{5x \sin \theta}{5 \cos \theta - x}$$

$$(b) x = 8 \text{ meters} \quad \frac{dx}{d\theta} \approx -6.298 \text{ m/rad}$$

$$(c) x \approx 7.937 \text{ meters}$$

$$7. \frac{dA}{dt} = -3.15 \text{ cm}^2/\text{sec}$$

$$8. (a) (0, 5) \text{ and } (-5/2, 0)$$

$$(b) \text{i. } 0 \quad \text{ii. } -\infty$$

$$(c) (-\infty, -1/2)$$

$$(d) (-\infty, 3/2)$$

