

Problem Set (Derivatives of Trig Functions)

Part A- Find the derivatives of the following functions. These problems do not involve the chain rule.

1. $y = 10 \sin x + 100$

5. $y = 14 \tan x \cos x + 10 \csc x$

2. $x(t) = 5 \sin t + 3 \cos t$

6. $g(x) = \sin^2 x + \cos^2 x + \sec x$

3. $f(x) = 8 \sin x \cos x$

7. $y = \frac{x^5}{4 \sin x}$

4. $S(r) = 9r^2 + 3 \tan r$

8. $q(r) = r^3 \cos r$

Part B – Find the derivatives of the following functions. These problems require the chain rule.

1. $y = 10 \tan(20x)$

5. $T = 4 \cot^3(4z)$

2. $y = 20 \sin^4 x$

6. $f(x) = 3 \sec^7 x$

3. $f(x) = 10 \cos^3(4x)$

7. $g(x) = 2 \csc^8(4x)$

4. $x(t) = 4 \tan^5(2t)$

8. $y = 1 + \tan^2(5x)$

Answers

Part A

1. $y' = 10 \cos x$

2. $x'(t) = 5 \cos t - 3 \sin t$

3. $f'(x) = 8 \cos^2 x - 8 \sin^2 x = 8 \cos(2x)$

4. $S'(r) = 18r + 3 \sec^2 r$

5. $y' = 14 \cos x - 10 \csc x \cot x$ or

$$y' = 14 \sec^2 x \cos x - 14 \tan x \sin x - 10 \csc x \cot x$$

6. $g'(x) = \sec x \tan x$

$$7. \quad y' = \frac{20x^4 \sin x - 4x^5 \cos x}{16 \sin^2 x} = \frac{4x^4(5 \sin x - x \cos x)}{16 \sin^2 x} = \frac{x^4(5 \sin x - x \cos x)}{4 \sin^2 x}$$

$$8. \quad q'(r) = 3r^2 \cos r - r^3 \sin r$$

Part B

$$1. \quad y' = 200 \sec^2(20x)$$

$$2. \quad y' = 80 \sin^3 x \cos x$$

$$3. \quad f'(x) = -120 \cos^2(4x) \sin(4x)$$

$$4. \quad x'(t) = 40 \tan^4(2t) \sec^2(2t)$$

$$5. \quad T' = -48 \cot^2(4z) \csc^2(4z)$$

$$6. \quad f'(x) = 21 \sec^7 x \tan x$$

$$7. \quad g'(x) = -64 \csc^8(4x) \cot(4x)$$

$$8. \quad y' = 10 \tan(5x) \sec^2(5x)$$