

Differentiate each of the following functions.

1.  $f(x) = \sqrt{x} \cos x$

2.  $f(x) = x^3 \sin x$

3.  $f(x) = \sqrt[3]{x^5} \sin x$

4.  $f(x) = (3x^8 - x^6) \sin x$

5.  $f(x) = \sin 2x$

6.  $f(x) = \frac{\sin x + \cos x}{x^3}$

7.  $f(x) = (3 \cos x - \sin x) \sqrt{x}$

8.  $f(x) = (x^3 - 5x^2 + 1) \sin x$

9.  $f(x) = \frac{\sin x}{x} + x^3 \cos x$

10.  $f(x) = (\cos x)(x^2 - 4x + 1)$

## Answers

1.)  $f'(x) = \frac{1}{2\sqrt{x}} \cos x - \sqrt{x} \sin x$       2.)  $f'(x) = x^3 \cos x + 3x^2 \sin x$

3.)  $f'(x) = (\cos x) \sqrt[3]{x^5} + \frac{5}{3} \sqrt[3]{x^2} (\sin x)$       4.)  $f'(x) = (\cos x) (3x^8 - x^6) + (\sin x) (24x^7 - 6x^5)$

5.)  $f'(x) = 2 (\cos^2 x - \sin^2 x) = 2 \cos 2x$       6.)  $f'(x) = \frac{1}{x^3} (\cos x - \sin x) - \frac{3}{x^4} (\cos x + \sin x)$

7.)  $f'(x) = \frac{1}{2\sqrt{x}} (3 \cos x - \sin x) + \sqrt{x} (-\cos x - 3 \sin x)$

8.)  $f'(x) = \sin x (3x^2 - 10x) + \cos x (x^3 - 5x^2 + 1)$

9.)  $f'(x) = \frac{1}{x} \cos x + 3x^2 \cos x - \frac{1}{x^2} \sin x - x^3 \sin x$

10.)  $f'(x) = (\cos x) (2x - 4) - (\sin x) (x^2 - 4x + 1)$

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