

Differentiate each of the following functions.

1. $f(x) = x^5 \cos x$

6. $f(x) = \cos^2 x$

2. $f(x) = x^3 \left(x - \frac{1}{x} \right)$

7. $f(x) = \cos 2x$

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

8. $f(x) = \frac{\sin x}{x^2}$

4. $f(x) = (3x^{10} - 5x^6) \cos x$

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

5. $f(x) = \frac{1}{2}x + \frac{1}{2} \sin x \cos x$

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

Answers

1. $f'(x) = -x^5 \sin x + 5x^4 \cos x$
2. $f'(x) = 4x^3 - 2x$
3. $f'(x) = (\cos x) \sqrt[3]{x^5} + \frac{5}{3} \sqrt[3]{x^2} (\sin x)$
4. $f'(x) = 30x^9 \cos x - 30x^5 \cos x - 3x^{10} \sin x + 5x^6 \sin x$
5. $f'(x) = \cos^2 x$
6. $f'(x) = -2 \sin x \cos x$
7. $f'(x) = -4 \sin x \cos x$
8. $f'(x) = \frac{1}{x^2} \cos x - \frac{2}{x^3} \sin x$
9. $f'(x) = -\sin x$
10. $f'(x) = -4 \sin x \cos x$

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