

Derivative-1

Differentiate the function (find $f'(x)$) and determine where in the domain the local extrema occur.

1. $f(x) = x^2 + x$

2. $f(x) = 1 - 2x^2$

3. $f(x) = x^3$

4. $f(x) = x^5$

5. $f(x) = \frac{1}{x^2}$

6. $f(x) = 3\sqrt{x} + 8x$

7. $f(x) = \sqrt[3]{x}$

8. $f(x) = x^3 + x^2 - 12$

9. $f(x) = 2x^3 - 3x^2 + 2x$

Answer Key

1. $f'(x) = 2x + 1$
local minimum at $x = -\frac{1}{2}$

2. $f'(x) = -4x$
local maximum at $x = 0$

3. $f'(x) = 3x^2$
plateau at $x = 0$

4. $f'(x) = 5x^4$
plateau at $x = 0$

5. $f'(x) = -\frac{2}{x^3}$
None

6. $f'(x) = \frac{3}{2\sqrt{x}} + 8$
None

7. $f'(x) = \frac{1}{3\sqrt[3]{x^2}}$
None

8. $f'(x) = 3x^2 + 2x$
local maximum at $x = -\frac{2}{3}$
local minimum at $x = 0$

9. $f'(x) = 6x^2 - 6x + 2$
None