

Topic 17: Derivatives and graphs

Determine the intervals where the function is increasing and where it is decreasing and the intervals of concavity.

1. $f(x) = x^3 - 3x^2 + 4$

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

3. $f(x) = x^{3/4} - 4x^{1/4}$

4. $f(x) = (x^2 + 1)^{2/3}$

5. $f(x) = \frac{x^2}{x^2 - 9}$

6. $f(x) = \frac{x^2 - 5x + 4}{x}$

Answers

1) Inc: $(-\infty, 0), (2, \infty)$ Dec: $(0, 2)$ CD: $(-\infty, 1)$ CU: $(1, \infty)$

2) Inc: $(-\infty, -1), (1, \infty)$ Dec: $(-1, 0), (0, 1)$ CD: $(-\infty, 0)$ CU: $(0, \infty)$

3) Inc: $\left(\frac{16}{9}, \infty\right)$ Dec: $\left(0, \frac{16}{9}\right)$ CD: $(16, \infty)$ CU: $(0, 16)$

4) Inc: $(0, \infty)$ Dec: $(-\infty, 0)$ CU: $(-\infty, \infty)$

5) Inc: $(-\infty, -3), (-3, 0)$ Dec: $(0, 3), (3, \infty)$ CD: $(-3, 3)$ CU: $(-\infty, -3), (3, \infty)$

6) Inc: $(-\infty, -2), (2, \infty)$ Dec: $(-2, 0), (0, 2)$ CD: $(-\infty, 0)$ CU: $(0, \infty)$