

Derivatives and the Shapes of Graphs- HW Problems

For the following functions determine where the graph is increasing/decreasing, concave up/down, and identify all local maxima/minima and inflection points.

1. $f(x) = x^3 - 6x^2 + 12x$

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

3. $g(x) = \frac{x}{x^2+1}$

4. $h(x) = \sin(x) + \cos(x)$ on $[0, 2\pi]$

5. $g(x) = x\sqrt{x+1}$

Use the second derivative test to determine all relative maxima and minima.

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

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

8. $g(x) = \frac{x^2}{x-1}$

9. $h(x) = \cos^2(x)$ on $(-\frac{\pi}{2}, \frac{3\pi}{2})$

10. $f(x)$ is a differentiable (and hence continuous) function on $[-6,6]$. Use the information below to identify where the graph of $f(x)$ is increasing/decreasing, concave up/down and the x coordinate of any local maxima/minima and inflection points.

sign of $f'(x)$ $\begin{array}{ccccccc} + & | & + & | & - & | & - & | & + \\ -2 & & 1 & & 3 & & 5 & & \end{array}$

sign of $f''(x)$ $\begin{array}{ccccccc} + & | & - & | & - & | & + & | & + \\ -2 & & 1 & & 3 & & 5 & & \end{array}$