Concavity and the Second Derivative Test

In problems 1-4, Determine the open intervals on which the graph of the function is concave upward or concave downward.

1. $f(x) = -7x^2 - 3x + 2$	2. $f(x) = 2x^3 - 4x^2 - 3$
3. $f(x) = \dfrac{2x}{x^2 + 1}$	4. $f(x) = \dfrac{x+3}{x-2}$

In problems 5-8, Discuss the concavity of the graph of the function and find the points of inflection.

5. $f(x) = x^3 - 21x^2 + 18x - 6$	6. $f(x) = x^4 + 4x^3 - 18x^2 + 12x - 48$
7. $f(x) = x^4 + 3x^2$	8. $f(x) = 5x(3 - x)^2$

In problems 9-11, Find all relative extrema of the function. Use the Second-Derivative Test when applicable.

9. $f(x) = x^2 - 8x + 2$	10. $f(x) = 2x^3 - 21x^2 + 60x + 12$
11. $f(x) = x^{1/3} - 4$	

In problems 12-13, Find all relative extrema and points of inflection.

12. $f(x) = -x^3 + 3x$	13. $f(x) = x^4 - 4x^2 + 2$

14. Find the point of diminishing returns for the function R (revenue) and x is amount spent.

$$R = -x^3 + 6x^2 + 2$$

15. Find the point of diminishing returns for the function R (revenue) and x is amount spent

$$R = x^3 - 15x^2 + 12x - 6$$