Section 13.3, problem 14.

$$y = -\frac{x^4}{4} + \frac{9x^2}{2} + 2x \implies y' = -x^3 + 9x + 2 \implies y'' = -3x^2 + 9.$$

- $y'' = 0 \implies 9 - 3x^2 = 0 \implies$ possible points of inflection: $x = \pm\sqrt{3}$.
- $y''(-2) = -3 < 0$, so $y'' < 0$ and y is concave ***down*** in the interval $(-\infty, -\sqrt{3})$.
- $y''(0) = 9 > 0$, so $y'' > 0$ and y is concave ***up*** in the interval $(-\sqrt{3}, \sqrt{3})$.
- $y''(2) = -3 < 0$, so $y'' < 0$ and y is concave ***down*** in the interval $(\sqrt{3}, \infty)$.
- Points of inflection at $x = \pm\sqrt{3}$.

Section 13.4, problem 6:

$$y = x^3 - 12x + 1 \implies y' = 3x^2 - 12 \implies y'' = 6x.$$

Critical points: $y' = 0 \implies 3x^2 = 12 \implies x^2 = 4 \implies x = \pm 2$.
Second derivative test:
(i) $y''(-2) = -12 < 0 \implies y(-2) = 17$ is a relative *maximum*.
(ii) $y'(2) = 12 > 0 \implies y(2) = -15$ is a relative *minimum*.