Problem 1. For the following functions, find points of local extremum, intervals of concavity and points of inflection. Use the above information to sketch the graph of the given function.

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

2. $*$ $f(x) = 36x + 3x^2 - 2x^3$.

3. $f(x) = 5x^3 - 3x^5$.

4. $f(x) = 5x^{2/3} - 2x^{5/3}$.

5. $f(x) = \sin x + \cos x, \quad 0 \le x \le 2\pi$.

6. $f(x) = x\sqrt{6 - x}$.

Problem 2. Find all the asymptotes of the following curves.

1. $*y = \dfrac{2x^2 + x - 1}{x^2 + x - 2}$.

2. $*y = \dfrac{x - 9}{\sqrt{4x^2 + 3x + 2}}$.

3. $y = \dfrac{\sqrt{x + 3x^2}}{4x - 1}$.

4. $y = \dfrac{\sqrt{1 + 4x^6}}{2 - x^3}$.

5. $y = \sqrt{9x^2 + x} - 3x$.

6. $y = \dfrac{5 + 4x}{x^2 - 9}$.