

**Due: August 15, 2024**

1. Find the stationary values (critical values) of the following (check whether relative maxima, or minima, or inflection points) assuming the domain to be the set of all real numbers.
  - a)  $y = x^2 + 3$
  - b)  $y = 3x^2 - 6x + 2$
2. Find the stationary values of the following (check whether relative maxima or minima or inflection points), assuming the domain to be the interval  $[0, \infty)$ .
  - a)  $y = x^3 - 3x + 5$
  - b)  $y = \frac{1}{3}x^3 - x^2 + x + 10$
  - c)  $y = -x^3 + 4.5x^2 - 6x + 6$
3. Find the maximum and the minimum values and points:
  - a)  $f(x) = x^2 - 5x + 3, -\infty < x < +\infty$
  - b)  $f(x) = x^3 - x, -\infty < x < +\infty$
4. Solve the following exercises by the method of Lagrange multipliers:
  - a) Minimize the function  $x^2 + 3y + 10$ ; subject to the constraint:  $8 - x - y = 0$
  - b) Maximize  $x^2 + xy - 3y^2$ ; subject to the constraint:  $2 - x - 2y = 0$
  - c) Maximize  $-2x^2 - 2xy - \frac{3}{2}y^2 + x + 2y$ ; subject to the constraint:  $x + y - \frac{5}{2} = 0$