

# Chapter 4.2: Optimization

## Calculus I

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- Let  $g(x) = x^2 - 6x + 11$ .
  - What is the global minimum and maximum of  $g(x)$  on the interval  $[1, 4]$ ?
  - What is the global minimum and maximum of  $g(x)$  on the interval  $[3, 4]$ ?
- Consider  $f(x) = xe^{-x^4}$ , where  $x$  is always greater or equal to zero. What is the maximum value of  $f(x)$ ? What is the minimum value?
- Sketch a continuous function that has local minima at 2 and 4, a global maximum at 3, and no other extrema.
- Sketch a continuous function that has no critical points but has an inflection point at  $x = -2$ .
- A grapefruit is tossed straight up with an initial velocity of 50 ft/s. The grapefruit is 5 feet above the ground when it is released. Its height at time  $t$  is given by

$$h(t) = -16t^2 + 50t + 5. \quad (1)$$

- How high does it go before returning to the ground?
- At what time does the grapefruit to reach its maximum height?