1. (6) The function $f(x) = \frac{1}{6}x^6 - 2x^5 + \frac{13}{2}x^4 + \frac{16}{3}x^3 - \frac{123}{2}x^2 + 90x + 42$ has critical numbers at $x = -2, 1, 3, 5$. Use the First Derivative Test to determine where the relative extrema of $f(x)$ occur (that is, at what $x$ values).

- $f(x)$ has (a) relative maximum/maxima at $x =$
- $f(x)$ has (a) relative minimum/minima at $x =$
2. (6,2) A company finds that their profit (in thousands of dollars) from manufacturing $x$ items can be modeled by $P(x) = \frac{3}{2} \ln (-x^3 + 15x^2 - 48x + 60)$ for $0 \leq x \leq 11$.

(a) How many units should the company produce in order to maximize their profit?

(b) What is the company’s maximum profit?
3. (6) Suppose that the cost function to produce $x$ items is $C(x) = 0.003x^3 + 4x + 4374$. Find the production level (value of $x$) that will result in the minimum average cost per unit.