Each section has suggested problems to help you get started. Only the required problems should be submitted.

Section 1.1.

- Suggested: 1, 5, 7, 13.
- Required: 14, 22.

Section 1.2.

- Suggested: 1, 3, 9, 13, 19.
- Required: 26, 27, 34.

Section 1.3.

- Suggested: 1, 5, 11, 15, 17, 32.
- Required:
  1. Locate all relative maxima, relative minima, and saddle points, if any, for $f(x, y) = xy - x^3 - y^2$.
  2. A manufacturer makes two models of an item, standard and deluxe. It costs $40 to manufacture the standard model and $60 for the deluxe. A market research firm estimates that if the standard model is priced at $x$ dollars and the deluxe at $y$ dollars, then the manufacturer will sell $500(y - x)$ of the standard items and $45,000 + 500(x - 2y)$ of the deluxe items each year.
     (a) Give a function $R(x, y)$ whose output is the revenue generated by pricing the standard model at $x$ dollars and the deluxe model at $y$ dollars.
     (b) Give a function $C(x, y)$ whose output is the production cost associated to pricing the standard model at $x$ dollars and the deluxe model at $y$ dollars.
     (c) Find the pair of prices $(x, y)$ that will maximize the company’s profits $P(x, y)$ (and verify that this pair gives a maximum).

Section 1.4.

- Suggested: 1, 3, 5, 10.
- Required: 13, 14.