Part 8

Creating Graphs

Question 8.1. Consider the function $f(x) = x^2 - 4x + 3$.

(a) Find the domain and all x and y intercepts.

(b) Find the intervals where f is increasing and the intervals where f is decreasing. Identify each critical point as a local max, local min, or neither.

(c) Find the intervals where f is concave up and the intervals where f is concave down. Identify all inflection points.

(d) Combine parts **(a)**, **(b)**, and **(c)** to sketch the graph of f. Label all intercepts, extrema, and inflection points.

Question 8.2. Consider the function $f(x) = x^3 - 3x + 3$.

(a) Find the domain and all x and y intercepts.

(b) Find the intervals where f is increasing and the intervals where f is decreasing. Identify each critical point as a local max, local min, or neither.

(c) Find the intervals where f is concave up and the intervals where f is concave down. Identify all inflection points.

(d) Combine parts **(a)**, **(b)**, and **(c)** to sketch the graph of f. Label all intercepts, extrema, and inflection points.

Question 8.3. Consider the function $f(x) = x^4 - 2x^2$.

(a) Find the domain and all x and y intercepts.

(b) Find the intervals where f is increasing and the intervals where f is decreasing. Identify each critical point as a local max, local min, or neither.

(c) Find the intervals where f is concave up and the intervals where f is concave down. Identify all inflection points.

(d) Combine parts **(a)**, **(b)**, and **(c)** to sketch the graph of f. Label all intercepts, extrema, and inflection points.

Question 8.4. Consider the function $f(x) = x + \sin x$.

(a) Find the domain and all x and y intercepts.

(b) Find the intervals where f is increasing and the intervals where f is decreasing. Identify each critical point as a local max, local min, or neither.

(c) Find the intervals where f is concave up and the intervals where f is concave down. Identify all inflection points.

(d) Combine parts **(a)**, **(b)**, and **(c)** to sketch the graph of f. Label all intercepts, extrema, and inflection points.

Question 8.5. Consider the function $f(x) = \sqrt{16 - x^2}$.

(a) Find the domain and all x and y intercepts.

(b) Find the intervals where f is increasing and the intervals where f is decreasing. Identify each critical point as a local max, local min, or neither.

(c) Find the intervals where f is concave up and the intervals where f is concave down. Identify all inflection points.

(d) Combine parts **(a)**, **(b)**, and **(c)** to sketch the graph of f. Label all intercepts, extrema, and inflection points.

Question 8.6. Consider the function $f(x) = \ln(3 - x^2)$.

(a) Find the domain and all x and y intercepts.

(b) Find the intervals where f is increasing and the intervals where f is decreasing. Identify each critical point as a local max, local min, or neither.

(c) Find the intervals where f is concave up and the intervals where f is concave down. Identify all inflection points.

(d) Combine parts **(a)**, **(b)**, and **(c)** to sketch the graph of f. Label all intercepts, extrema, and inflection points.