## WORKSHEET 16

GRAPHING FUNCTIONS

10 March 2020

- 1. Midterm 2 is in a week. On another sheet of paper, make a brief plan of how you will study for the test.
- 2. (Warm-up) What does the second derivative test tell us?

3. (Warm-up) If we are given the formula for a function, how do we find the inflection points?

4. Use the second derivative test to find the local extrema of  $f(x) = x^5 - 2x^4 - 15x^3 + 20x^2 + 44x - 48$  (do not simplify your answers).

- 5. Sketch the graph of a function satisfying the following conditions.
  - (a) f'(x) > 0 and f''(x) < 0 for all x.
  - (b) f'(x) < 0 for x < 0 and f'(x) > 0 for x > 0, and f''(x) < 0 for |x| > 2 and f''(x) > 0 for |x| < 2.

- 6. For each of the following functions:
  - i. find the critical points;
  - ii. use the second derivative test (and the first derivative test, where necessary) to check whether each critical point is a local maximum or local minimum;
  - iii. find the inflection points;
  - iv. determine intervals on which the function is increasing, decreasing, concave up, and concanve down;
  - v. use the above information to give a sketch of the graph.
  - (a)  $f(x) = 3x^4 8x^3 + 6x^2$

(b) 
$$f(x) = \frac{1}{\cos x + 1}$$
 on  $[0, 2\pi]$ 

(c) 
$$f(x) = xe^{-x^2}$$

(d) 
$$f(x) = \frac{1}{x} - \frac{1}{1-x}$$