

# MTH 251Z Lab

## The Derivative Function

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### Prompts

1. Use the graph of  $f$  provided below to calculate the following values.

- |             |                                 |                                    |
|-------------|---------------------------------|------------------------------------|
| (a) $f(-3)$ | (b) $f'(-3)$                    | (c) $\lim_{x \rightarrow -3} f(x)$ |
| (d) $f(-2)$ | (e) $f'(-2)$                    | (f) $\lim_{x \rightarrow -2} f(x)$ |
| (g) $f(-1)$ | (h) $f'(-1)$                    | (i) $\lim_{x \rightarrow -1} f(x)$ |
| (j) $f(0)$  | (k) $f'(0)$                     | (l) $\lim_{x \rightarrow 0} f(x)$  |
| (m) $f(2)$  | (n) $f'(2)$                     | (o) $\lim_{x \rightarrow 2} f(x)$  |
| (p) $f(3)$  | (q) $f'(3)$ ( <i>Estimate</i> ) | (r) $\lim_{x \rightarrow 3} f(x)$  |

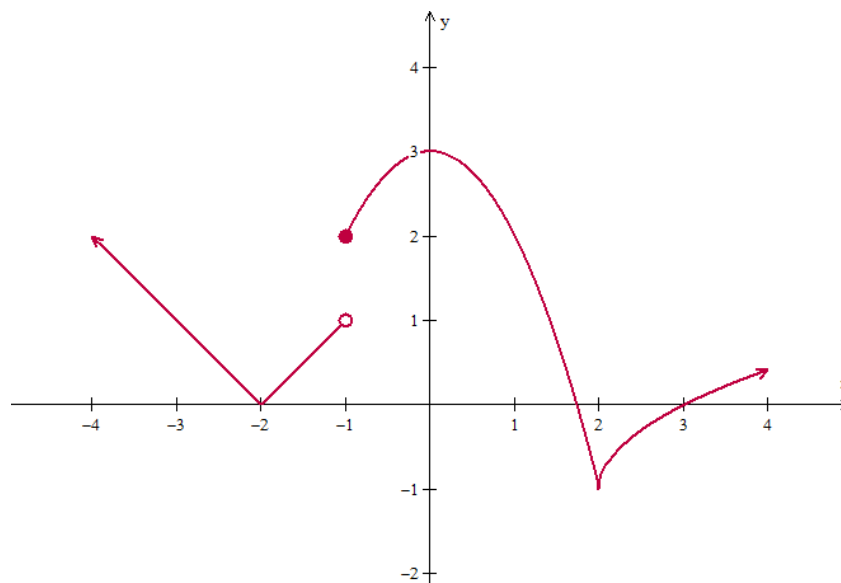


Figure 1: The graph of  $y = f(x)$ .

2. Given the graph of  $y = f(x)$  provided below, sketch a graph of  $y = f'(x)$ .

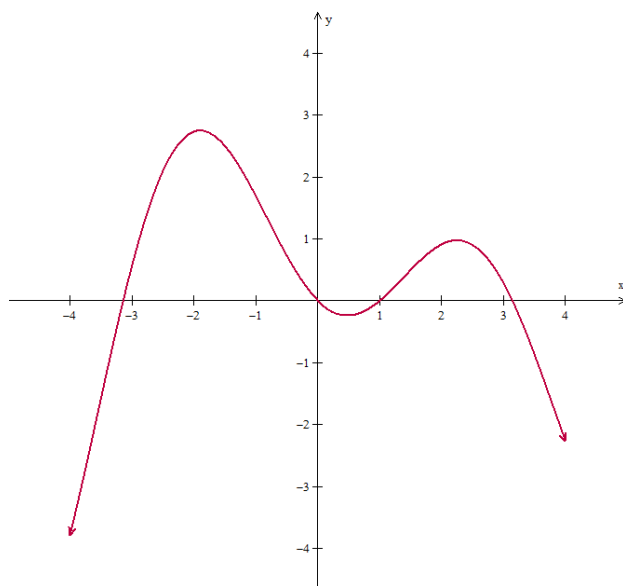


Figure 2: The graph of  $y = f(x)$ .

3. Sketch the graph of  $f(x) = \cos x$ . Below your graph, sketch the graph of  $f'(x)$  by first identifying when  $f'(x) = 0$  and then identifying when  $f'$  will be positive and when it will be negative.
4. Let  $f(x) = x^2 - x + 1$ .
- (a) Use the definition of derivative to calculate  $f'(x)$ .
  - (b) What is the domain of  $f$ ?
  - (c) What is the domain of  $f'$ ?
5. Let  $g(t) = \sqrt{t}$ .
- (a) Use the definition of derivative to calculate  $g'(t)$ .
  - (b) What is the domain of  $g$ ?
  - (c) What is the domain of  $g'$ ?
6. Let  $h(p) = \frac{2}{2p+1}$ .
- (a) Use the definition of derivative to calculate  $h'(p)$ .
  - (b) Find an equation of the line tangent to  $y = h(p)$  at the point  $(-1, -2)$ .