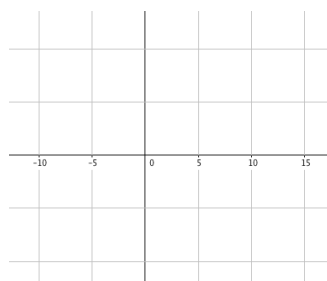
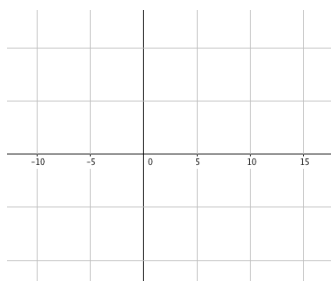
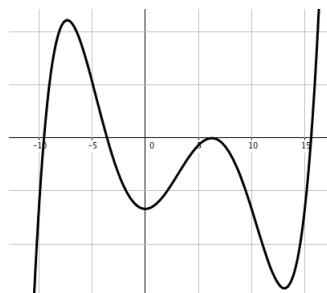


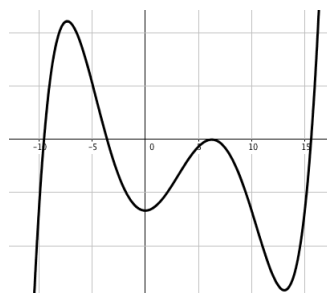
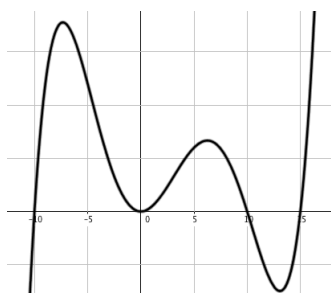
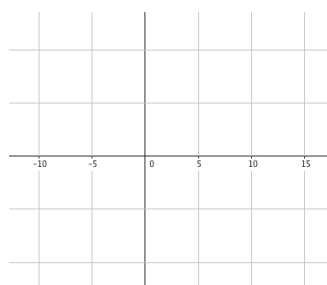
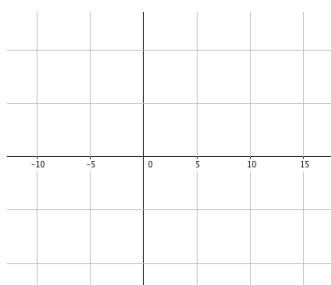
Math 131 - Study Session Problems

1 Slopes of Tangent lines

- For each of the two graphs below, sketch the graph of the “associated slope function” on the axes below. Recall that the associated slope function of f is the function whose value at $x = c$ is the slope of the tangent line to f at $x = c$, also known as the derivative of f .



- Is the associated slope function of f affected by vertical translations of f ? Explain why or why not.
- Given the graph of the associated slope function of f , sketch the graph of the original function f on the axes below.



- Is f affected by vertical translations of the associated slope function of f ? Explain why.

2 Definition of Derivative

5. For the following functions $f(x)$, use algebra to simplify the expressions $\frac{f(x+h) - f(x)}{h}$.

(a) $f(x) = x^3 - 3x$

(b) $f(x) = \sqrt{x}$

(c) $f(x) = \frac{1}{3x-1}$

6. Use your simplified expressions to compute $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ for each of the functions above.

(a)

(b)

(c)

7. For the following functions $f(x)$, use algebra to simplify the expressions $\frac{f(z) - f(x)}{z - x}$.

(a) $f(x) = x^2 + 2x - 1$

(b) $f(x) = \sqrt{2x + 2}$

(c) $f(x) = \frac{x}{x + 1}$

8. Use your simplified expressions to compute $\lim_{z \rightarrow x} \frac{f(z) - f(x)}{z - x}$ for each of the functions above.

(a)

(b)

(c)