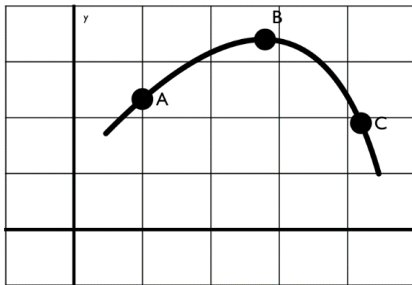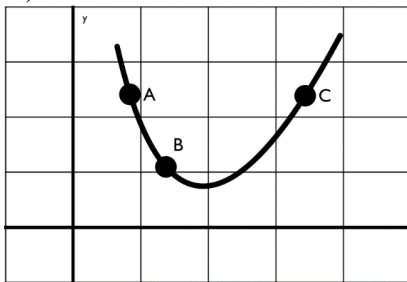# Limits & Continuity
1.5A – Slopes, Rates of Change, and Derivatives

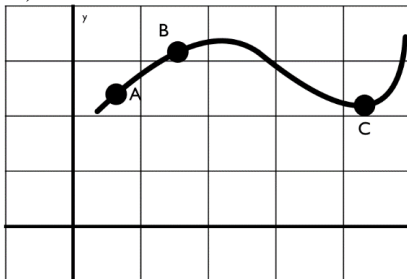A: If a tangent line were drawn at each point, state whether the slopes are positive, negative or zero at each point
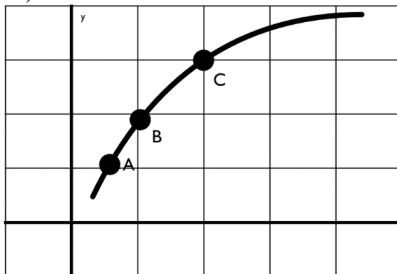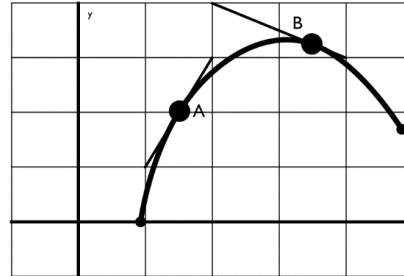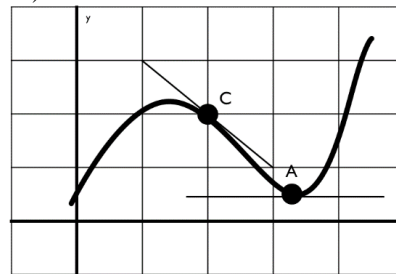
#1)

#2)

#3)

#4)

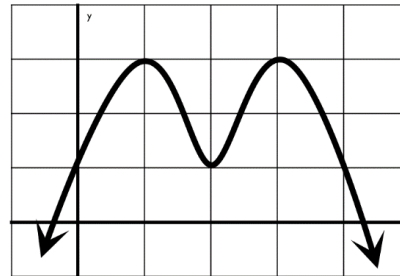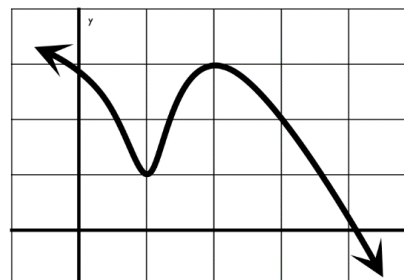B: Find the slopes of each tangent line by counting rise and run.

#5)

#6)

C: Use the graph of each function to make a rough sketch of the derivative showing where $f'(x)$ is positive, negative and zero.

#7)

#8)

D: Find the average rate of change (that means find the slope $m = \frac{\Delta y}{\Delta x}$) of the given function at the given x-values

#9) $y = x^2 + 7x$

   a.   (1, 8) and (3, 30)

   b.   (1, 8) and (2, 18)

   c.   (1, 8) and (1.1, 8.91)

   d.   (1, 8) and (1.01, 8.0901)

E: Find the instantaneous rate of change of the function, then find it specifically at the point given.

#10) $f(x) = x^2 + 7x$ at x = 1 (When finished, compare this answer and problem with #9)

#11) $f(x) = x^2 + 5$ at x = 3

#12) $f(x) = 2x - 4$ at x = 5

F: Find $f'(x)$ by definition.

#14) $f(x) = x^2 + x + 1$

#13) $f(x) = \frac{1}{x^2}$ at x = 7

#15) $f(x) = 8$

#16) $f(x) = \sqrt{x}$ (hint: at some point multiply by 1 in the form of $\frac{\sqrt{x+h}+\sqrt{x}}{\sqrt{x+h}+\sqrt{x}}$)

#18) $f(x) = \pi$

#17) $f(x) = \frac{2}{x}$

#19) $f(x) = \frac{x}{5}$