Name: _____ **AP**

Classwork 24

1. Describe two ways of approximating the instantaneous speed or exact slope of a curve.

2. a. Approximate the exact slope of the curve below at the following points using the graph:

i. x = 1 ii. x = 5

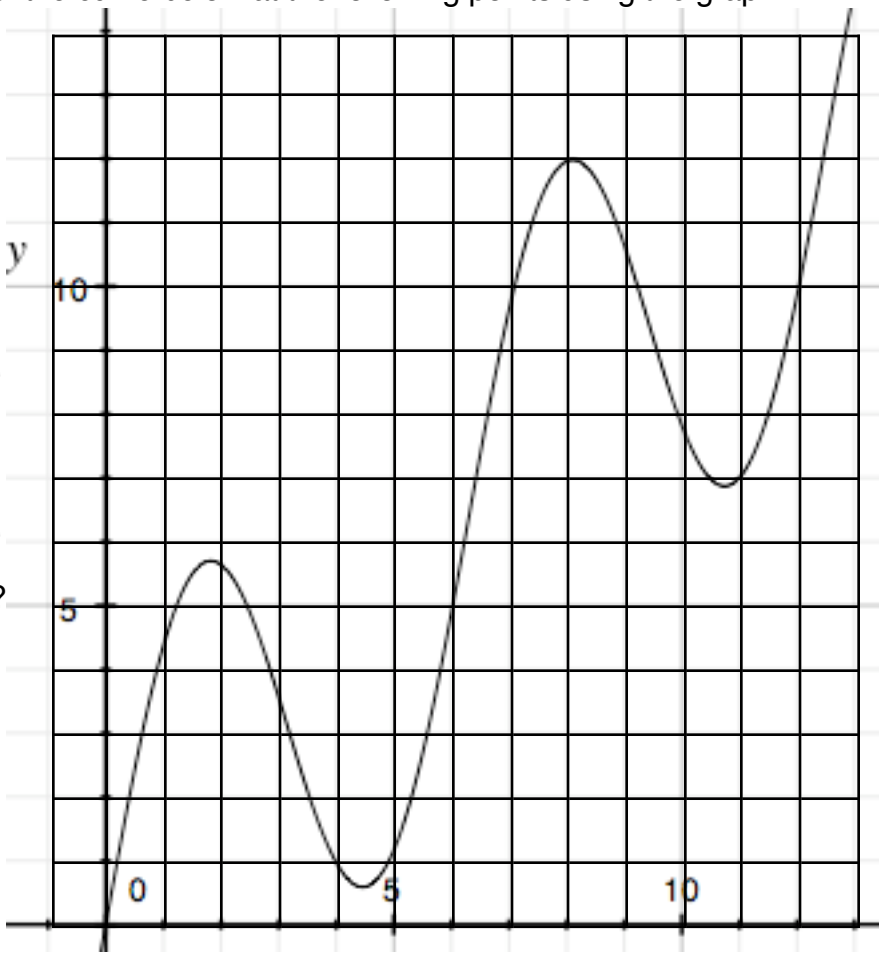
iii. x = 10

b. What is the formula for slope?

c. What happens to the formula if we try to have the slope at 1 point?

d. Why do we have to talk about the slope at exactly 1 point if we are using a graph like the one to the right?

e. How can we get around this problem?



The equation of this graph is

$$y = x + 4\sin x$$

f. Use the chart below to approximate the exact slope at x = 1.

First point		Second point		Δx	Δy	slope
x	y	x	y			
1		2				
1		1.7				
1		1.2				
1		1.1				
1		1.01				
1		1.001				

I think the exact slope is around:

c) Use the chart to approximate the exact slope at x = 5.

First point		Second point		Δx	Δy	slope
x	y	x	y			
5		6				
5		5.5				
5		5.1				
5						
5						
5						

I think the exact slope is around:

d) Approximate the slope at x = 10 by using a series of points near x = 10.

First point		Second point		Δx	Δy	slope
x	y	x	y			
10						

I think the exact slope is around:

3. Let's say we are dealing with the graph of $f(x) = \dfrac{\frac{1}{3}x^4 - 5x^2 + 1}{x^2 + 2x + 4}$

a) Investigate the slope around x = 1 using a chart.

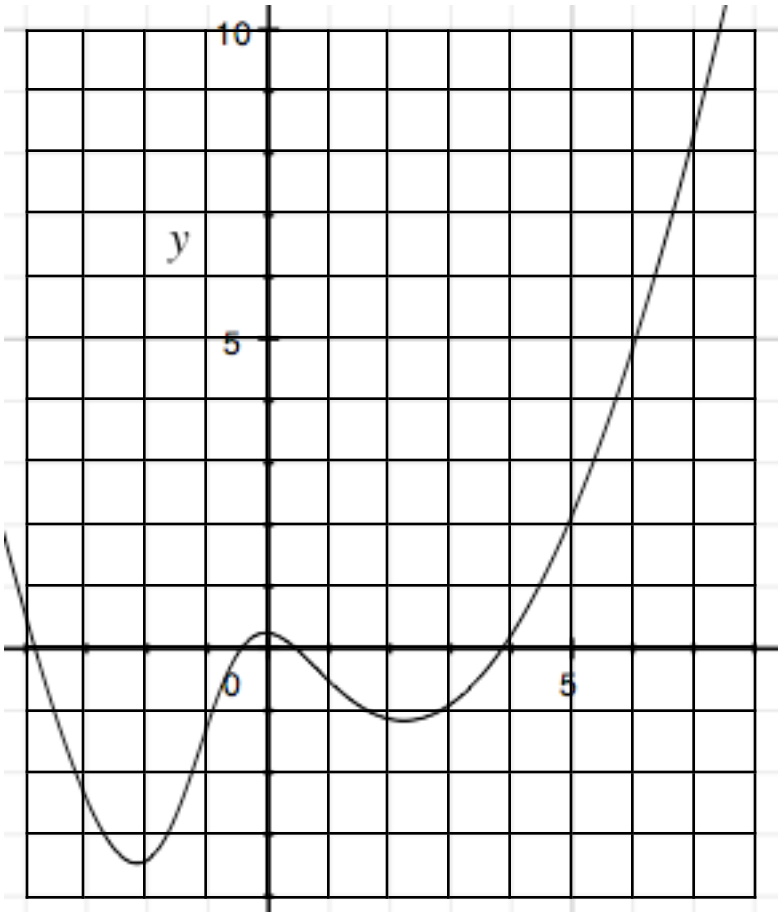
First point		Second point		Δx **"h"**	Δ f(x)	slope
x	f(x)	x	f(x)			

b) Investigate the slope around x = 5 using the chart. This time, however, Δx is given.

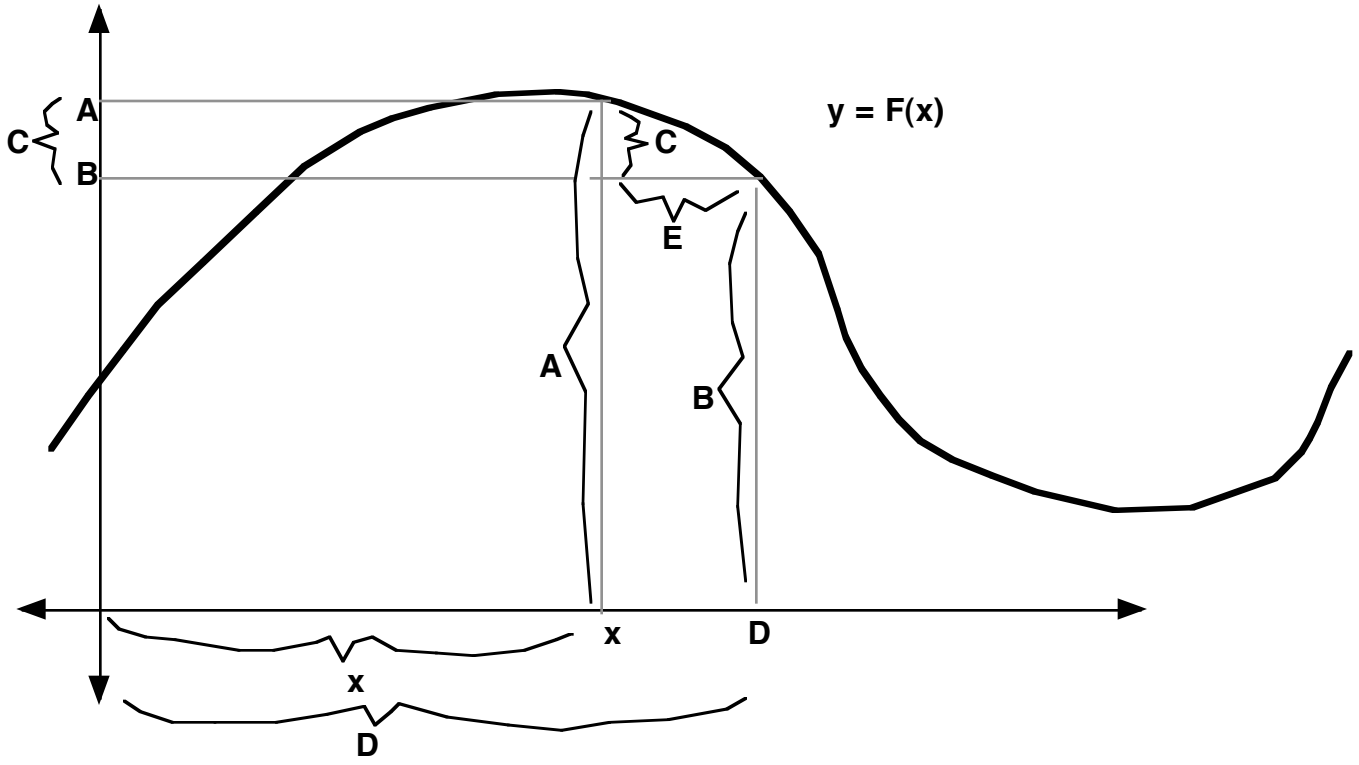
First point		Second point		Δx "h"	Δ f(x)	slope
5				.8		
				.2		
				.05		
				.001		
So in general, in terms of only **x** , **h**, and **f(x)....**						
x						

c) Use the graph to check your answers

d) Write a limit to express the exact slope at a point **x.**



4.Label the drawing to show where each expression below goes (and what it represents).
1. F(x) 2. h 3. F(x + h) 4. x + h 5. F(x + h) - F(x)



Practice Problem

1. Use a small Δx near the point given to find the approximate slope.

a) $f(x) = 3x - 2$ $x = 5$

b) $f(x) = x^2 - 4x + 1$ $x = 6$

c) $f(x) = \sin x$ $x = 8$