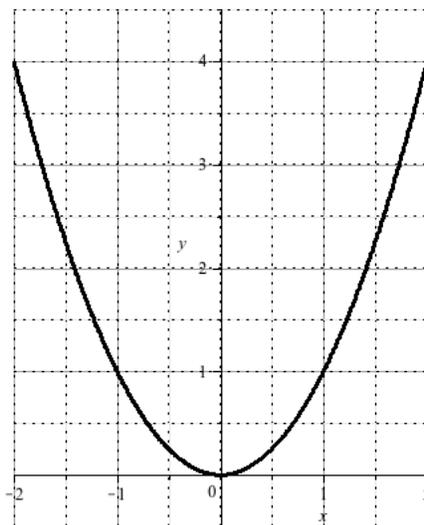


Review of Formulas (Do not use any numbers or functions from later in the handout.)

1. What is the point-slope equation of the line through the point (x_1, y_1) with slope m ?
2. What is the slope of the line through the points (x_1, y_1) and (x_2, y_2) ?
3. What is the slope of the line through $(a, f(a))$ and $(a + h, f(a + h))$?

Activity. For the rest of the handout, use $f(x) = x^2$. Its graph is below.



1. Your group's value of a is _____.
2. For your value of a , determine the point $(a, f(a))$, and mark it on the graph above.
3. For your value of a , determine the following points and plot them on the graph above.
 - (a) $(a + 1, f(a + 1))$
 - (b) $(a + 0.5, f(a + 0.5))$
 - (c) $(a + .1, f(a + 0.1))$
4. On the graph above, sketch the graphs of three lines – the lines through
 - (a) $(a, f(a))$ and $(a + 1, f(a + 1))$,
 - (b) $(a, f(a))$ and $(a + .5, f(a + 0.5))$, and
 - (c) $(a, f(a))$ and $(a + 0.1, f(a + 0.1))$.
5. What is a *secant line*?
6. Another name for *the slope of the secant line* is _____.

7. For your a , complete the table below.

h	$(a, f(a))$	$(a + h, f(a + h))$	avg. rate of change of f with respect to x on $[a, a + h]$
0.5			
0.1			
0.01			
0			

When the secant slopes approach a particular value as h gets closer and closer to, but does not reach, zero, that value is called the _____ and the _____ and the _____.

8. For your value of a and the function $f(x) = x^2$, what value do you predict for the slope of the tangent line?

9. Now, work it out precisely:

(a) Treating h as an unknown quantity and using *your value of a* , determine the slope of the line through $(a, f(a))$ and $(a + h, f(a + h))$. Simplify as much as possible.

(b) What value does the slope approach as h gets closer and closer to zero? (Note that h can take on positive or negative values as it approaches zero.)

10. On your graph, draw the line passing through $(a, f(a))$ whose slope is your answer to the previous part. This is the *tangent line* to the graph of $f(x) = x^2$ at the point $(a, f(a))$. Write an equation for your tangent line in point-slope form.

11. Record other groups' answers below:

a	-0.5	0	0.5	1
slope of tangent line				

12. Describe the overall pattern: what is the slope of the tangent line to the graph of $f(x) = x^2$ at the point $(b, f(b))$?