

Quiz 2 (100 points)**Due in class 6/4/2018****Name:**

NOTE: YOU MUST SHOW YOUR WORK TO RECEIVE FULL CREDIT. REMEMBER TO BOX YOUR FINAL ANSWER(S).

1. (10 pts) Write down a formula for the tangent line to a curve $f(x)$ in terms of (x_0, y_0) and the derivative of $f(x)$. Make sure to specify the correct x value for $f'(x)$.
2. (20 pts) Let $q(x) = ax^2 + bx + c$, $a \neq 0$.
 - (a) Calculate the derivative of $q(x)$ using derivative rules.
 - (b) What are the (x, y) -coordinates where $q'(x) = 0$?
 - (c) How do the (x, y) -coordinates compare to the (h, k) -coordinates from the formula for the Vertex of Quadratic Functions? Are they the same or are they different?
3. (20 pts) Let $f(x) = 10 - x^2$. (Calculator Recommended)
 - (a) Find the (h, k) -coordinates (Vertex of Quadratic Function) of $f(x)$.
 - (b) Using h from part (a), find the slope of the secant line of $f(x)$ going from $x = -0.1$ to $x = h$, from $x = -0.01$ to $x = h$, and from $x = -0.001$ to $x = h$. Do all of these secant lines have a positive or negative slope?
 - (c) Using h from part (a), find the slope of the secant line of $f(x)$ going from $x = h$ to $x = 0.1$, from $x = h$ to $x = 0.01$, and from $x = h$ to $x = 0.001$. Do all of these secant lines have a positive or negative slope?
 - (d) What do parts (b) and (c) indicate about the sign of the slope of $f(x)$ as we go from $x < h$ to $x > h$? (Hint: Drawing a picture may help.)
4. (15 pts) Let $f(x) = x^2 + 25$. (Calculator Recommended)
 - (a) Calculate the slope of the secant line between the points at $x = -7$ and $x = 0$.
 - (b) Find the value of x where the tangent line is parallel (has same slope as) the secant line. (Hint: You will need to calculate $f'(x)$, set it equal to something, and solve for x .)
5. (15 pts) Let $f(x) = \frac{1}{x}$ and $x > 0$. (Calculator Recommended)
 - (a) Calculate the slope of the secant line between the points at $x = 2$ and $x = 10$.
 - (b) Find the value of x where the tangent line is parallel to (has same slope as) the secant line. (Hint: You will need to calculate $f'(x)$, set it equal to something, and solve for x .)
6. (15 pts) Let $f(x) = \ln(x)$. (Calculator Recommended)
 - (a) Calculate the slope of the secant line between the points at $x = 3$ and $x = 20$.
 - (b) Find the value of x where the tangent line is parallel to (has same slope as) the secant line. (Hint: You will need to calculate $f'(x)$, set it equal to something, and solve for x .)
7. (5 pts) Based on problems 4, 5, and 6, what is the relation between the location of the parallel tangent line and the points chosen to make the secant line, i.e. if $x = a$ and $x = b$ are the points used to create the secant line and $x = c$ is the location of the tangent line, do we have $c \leq a$, $a < c < b$, or $b \leq c$?