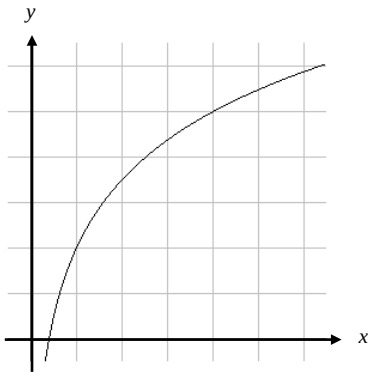
AP Calculus
3.1 Worksheet

All work must be shown in this course for full credit. Unsupported answers may receive NO credit.

1. What is the definition of a derivative?

2. What is the alternative definition of a derivative?

3. Identify or sketch each of the quantities on the figure to the right.



   a) $f(1)$ and $f(4)$

   b) $f(4)-f(1)$

   c) $y=\frac{f(4)-f(1)}{4-1}(x-1)+f(1)$

   d) Insert the proper inequality symbol (< or >) between the given quantities.

      i) $\frac{f(4)-f(1)}{4-1} \square \frac{f(4)-f(3)}{4-3}$

      ii) $\frac{f(4)-f(1)}{4-1} \square f'(1)$

4. The figure to the right shows the graph of g'.

   a) $g'(0)=$

   b) $g'(3)=$

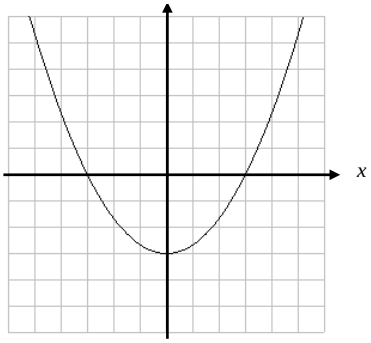
   c) What can you conclude about the graph of g knowing that $g'(1)=-\frac{8}{3}$?

   d) What can you conclude about the graph of g knowing that $g'(4)=\frac{7}{3}$?

   e) Is $g(6)-g(4)$ positive or negative? Explain.

   f) Is it possible to find g (2) from the graph? Explain.

The graph of g'



5. Assume that $f'(c)=3$. Find $f'(-c)$ given the following conditions:

   a) f is an odd function.

   b) f is an even function.

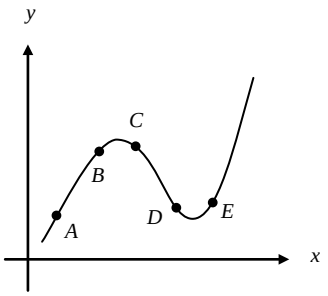
6. Use the graph of f at the right to answer each question.

a) Between which two consecutive points is the average rate of change of the function greatest?

b) Is the average rate of change of the function between A and B greater than or less than the instantaneous rate of change of B?

c) Sketch a tangent line to the graph between the points B and C such that the slope of the tangent line is the same as the average rate of change of the function between B and C.

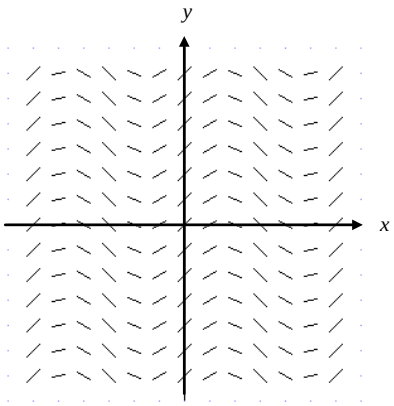
d) Give any sets of consecutive points for which the average rates of change of the function are approximately equal.



7. Sketch a function whose derivative is ALWAYS negative.

8. Sketch a function whose derivative is ALWAYS positive.

9. Use the slope field below to sketch at least two possible graphs of the function f.



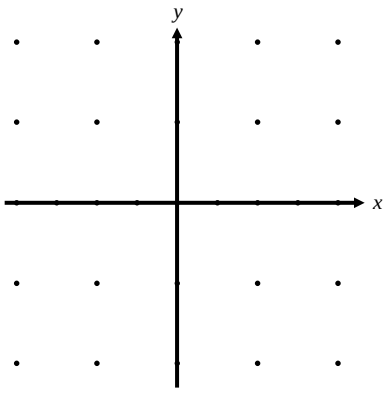
The equation for this slope field is $\frac{dy}{dx} = \cos x$.

What do you think the original function was?

10. Use the grid to the right.

a) Draw the slope field for $\frac{dy}{dx} = -\frac{x}{y}$.

b) If the point (0, –1) is on the graph of y, draw the graph of y.



12. Complete the following questions from the textbook: pages 105 – 108: #1 – 8, 13 – 17, 21, 26, 32, 44