

**Math 131 Week in Review**  
**Sections 2.6, 2.7, 2.8, 3.1**  
**2/28/10**

**Finding Derivatives By Definition** (Sections 2.6-2.7)

$$f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

1. Find  $f'(a)$  for  $f(t) = t - 2t^3$

2. Find the equation to the tangent line of  $f(t)$  in #1 at  $x = 1$ .

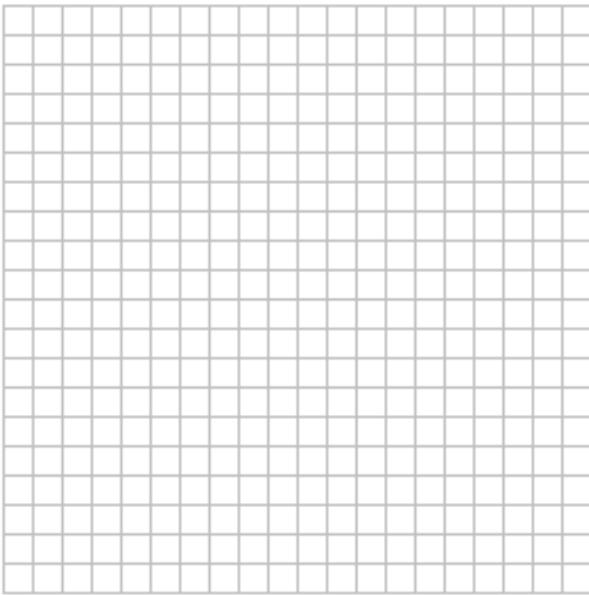
3. Find  $f'(a)$  for  $f(x) = \frac{3}{x^2}$ .

4. Find  $f'(a)$  for  $f(x) = \frac{2}{x-3}$

5. Find the equation to the tangent line for  $f(x)$  in #4 at  $x = 4$ .

6. Find  $f'(a)$  for  $f(x) = \frac{4}{\sqrt{1-x}}$ .

7. Sketch a graph of a function  $g$  for which  $g(0) = 1$ ,  $g'(0) = -2$ ,  $g(1) = 2$ , and  $g'(1) = 1$ .



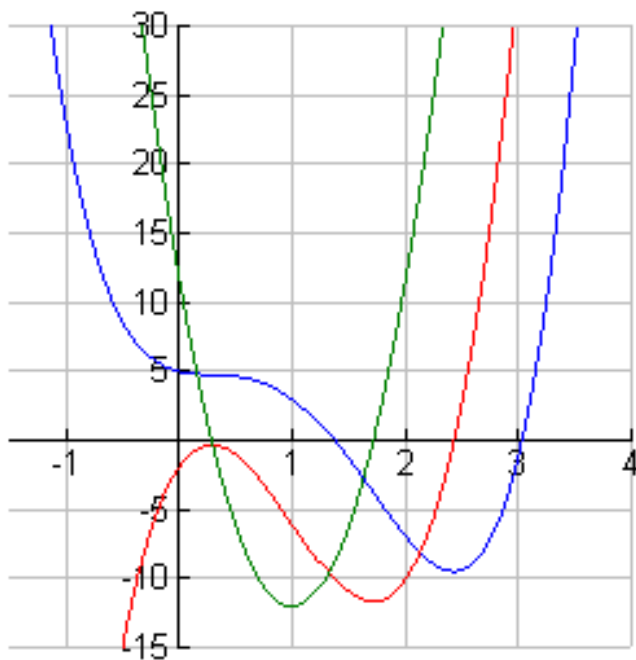
8. A particle moves along a straight line with equation of motion  $s(t) = 50 + 8t - 16t^2$ . Find the velocity and speed when  $t = 3$ .

**Derivatives From a Table** (Section 2.6)

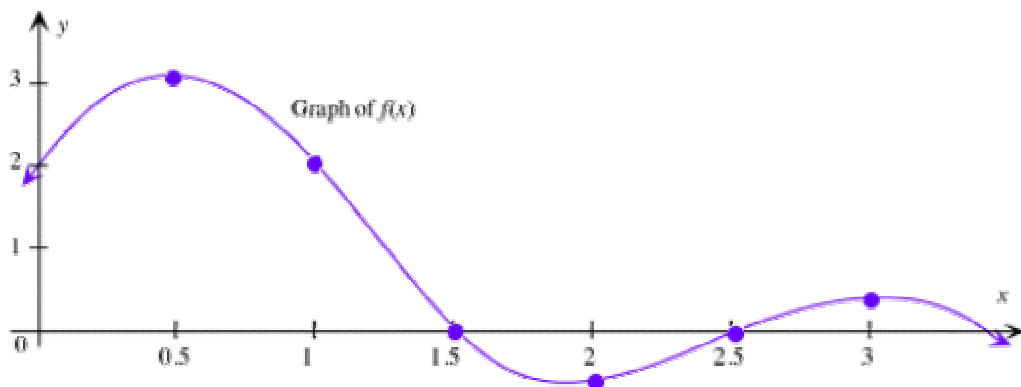
9. The table below gives the approximate distance traveled by a downhill skier after  $t$  seconds for  $0 \leq t \leq 10$ . What is the meaning of  $D'(6)$ ? Estimate its value.

$t$	0	2	4	6	8	10
$D$	0	13	53	120	212	333

10. The graphs of  $g$ ,  $g'$ , and  $g''$  are given below. Label the graphs appropriately.

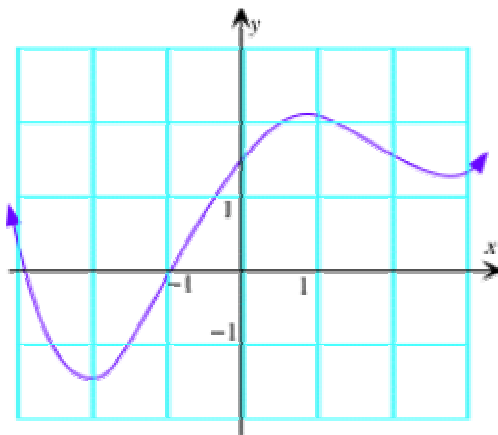


### Derivatives From a Graph (Section 2.7)



11. Estimate the slope of the tangent at each of the points (dots) on the graph.

12. Sketch the derivative of  $f$  on the same coordinate system above.

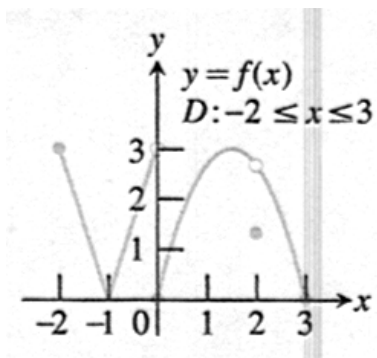


13. Estimate the slope of the tangent at each integer  $x$ -value on the graph.

14. Sketch the derivative of  $f$  on the same coordinate system above.

15. Give the intervals or points where the graph given below is not differentiable. Explain.

Finney, R. L., Demana, F. D., Waits, B. K., & Kennedy, D. (2007). *Calculus: Graphical, Numerical, Algebraic*.

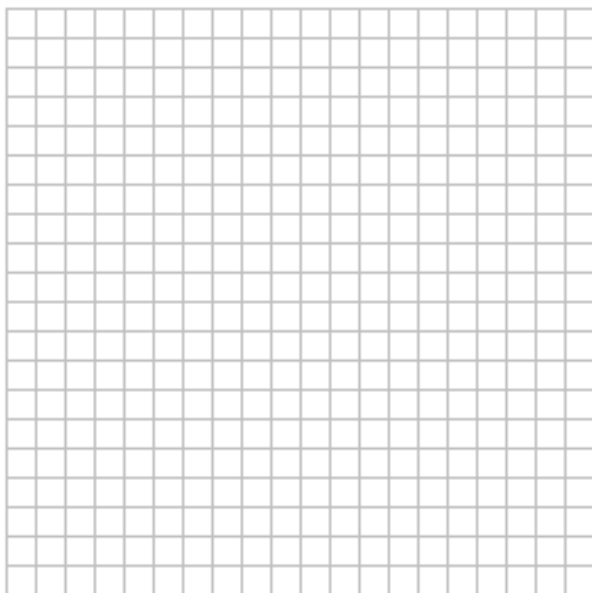


16. Sketch a graph of a function that satisfies all of the given conditions.

$$F'(1) = F'(3) = 0$$

$$F'(x) > 0 \text{ if } x < 1 \text{ or } x > 3$$

$$F'(x) < 0 \text{ if } 1 < x < 3$$



17. Differentiate:  $g(x) = x\sqrt{29}$

18. Differentiate:  $f(t) = t^3 + 5t^2 - \frac{2}{3}t + 21$

19. Find any and all  $x$ -values where the tangent line is horizontal.

20. Differentiate:  $h(x) = \frac{3x^2 - 6x + 24}{3x}$

21. Differentiate:  $f(u) = e^{u-1} + 3$

22. Find the equation of the tangent line for the function in #21, at  $u = 1$ .

23. Differentiate:  $g(t) = \sqrt[3]{t} - 5\sqrt{t^3}$