

$$f(u) = |u| \rightarrow f'(u) = \frac{u}{|u|} u'$$

$$f(x) = g[h(x)] \rightarrow f'(x) = g'[h(x)]h'(x)$$

**Differentiate the following. Do not simplify 7-11.**

1.  $y = |3x^2 - 2|$

2.  $y = |\sin 2x|$

3.  $y = \sin |2x|$

4.  $y = \sqrt[3]{2x+1}$

5.  $y = (3x^4 + 2x + 1)^3$

6.  $y = \frac{1}{\sqrt[4]{x^2 - 3}}$

7.  $y = \frac{\sqrt{x}}{2x^3 - 3x}$

8.  $y = (x^3 - 3)^2 (2x^2 + 4x)^3$

9.  $y = x \cos x^3$

10.  $y = x^2 \tan 3x$

11.  $y = \frac{\sec 4x}{\cot^2 2x}$

A disruptive calculus student named Bucky Nevermiss shoots a paper clip in to the air using a rubber band. The paper clip is shot from the floor upward with an initial velocity of 64 ft./sec.

12. Write the equation of the position function.

13. Write the equation of the velocity function.

14. Determine how high the paper clip goes and how long it takes to get to that height.

15. What is the velocity of the paper clip when it reaches its maximum height?

16. How long does the paper clip stay in the air?

17. With what velocity does the paper clip hit the ground?

18. The courageous and competent calculus teacher, Mr. King unexpectedly moves into the downward path of the paper clip. At what time will he be struck on the head by the paper clip? (i.e. How long is it before Bucky Nevermiss gets detention from the 6 ft. tall instructor?)