PRACTICE PROBLEMS FOR EXAM II. NOTE THAT THERE WILL BE A SET OF ABOUT A DOZEN MULTIPLE CHOICE ITEMS AND ABOUT 6 BASIC FORMS WHICH WILL COME FROM THE DERIVATIVE FORMS #15 THRU #29 (OMITTING # 22 AND #23) ON THE BASIC FORMS SHEET.

I. USE THE Δx DEFINITION OF THE DERIVATIVE: $f'(x) = \lim_{\Delta x \to 0} \dfrac{f(x+\Delta x) - f(x)}{\Delta x}$

TO FIND THE DERIVATIVE OF THE FUNCTION.

2. $f(x) = 3x^2 - 4x - 7$.

III. FIND THE DERIVATIVE OF EACH FUNCTION. YOU NEED <u>NOT</u> SIMPLIFY YOUR RESULT.

3. $f(x) = 5x^5 + \dfrac{3}{x^3} - 12\sqrt{x}$

4. $f(x) = \tan(3x) - \csc(-x)$

5. $f(x) = 5x^{1/3}\csc(x)$

6. $f(x) = -\left(x^{-4} - x^3\right)^{-5}$

7. $f(x) = \dfrac{x + \cot(x)}{4x}$

8. $f(x) = \cos^2(x^3)$

9. $f(x) = \sqrt[4]{2 - x^3}$

10. $f(x) = \dfrac{4x^3 - 6x}{3x^4 + 6}$

V. USE IMPLICIT DIFFERENTIATION TO FIND $\dfrac{dy}{dx}$.

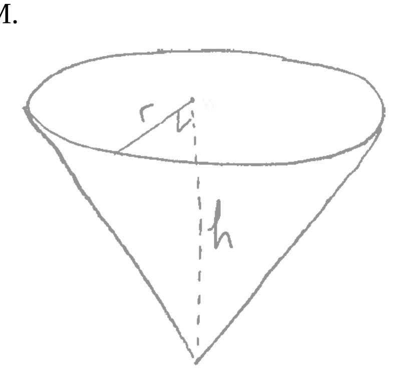
13. $x^3 - 4xy^3 + 3y^4 = 5y$

14. $3y + \cos(y) = 2x$

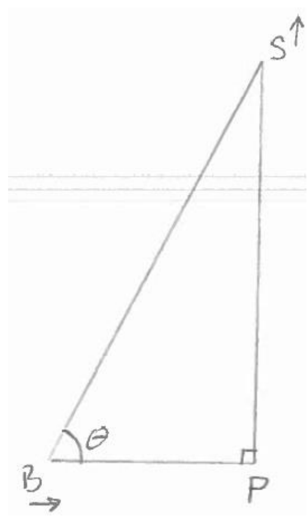
VI. USE THE METHODS DISCUSSED IN CLASS TO SOLVE EACH PROBLEM.

14. A FUEL TANK IN THE SHAPE OF AN INVERTED CONE (SEE FIGURE) IS FILLING WITH FUEL AT THE RATE OF $52\pi\ ft^3/\text{min}$, CAUSING THE HEIGHT OF THE FUEL TO INCREASE AT THE RATE OF $3\ ft/\text{min}$. HOW FAST IS THE RADIUS INCREASING WHEN THE VOLUME IS $12\pi\ ft^3$ AND THE RADIUS IS $2\ ft$?

THE VOLUME OF A CONE IS GIVEN BY $V = \frac{1}{3}\pi r^2 h$



15. SUPERMAN IS FLYING UP VERTICALLY AT THE RATE OF 12 m/s. BATMAN IS DRIVING TOWARD THE POINT LABELED P (SEE FIGURE) DIRECTLY BELOW SUPERMAN AT THE RATE OF 8 m/s. LABEL WHAT IS THE RATE OF CHANGE OF THE DISTANCE BETWEEN THEM WHEN SUPERMAN IS 120 METERS HIGH AND BATMAN IS 30 METERS FROM POINT P?



NOTE THAT <u>ANY</u> PROBLEM SIMILAR TO <u>ANY</u> HOMEWORK PROBLEM IS A POSSIBLE ITEM.