Phys 3610, Fall 2008
Problem Set #1, Hint-o-licious Hints

1. *Taylor*, **1.18** Recall that the area of a triangle follows the basic formula

$$\text{Area} = \tfrac{1}{2}(\text{base})(\text{height})$$

and use the fact that

$$\mathbf{a} \times \mathbf{b} = |ab \sin\theta|$$

where θ is the angle between $\mathbf{a}$ and $\mathbf{b}$.

2. *Taylor*, **1.28** Now there are forces between particles 1 and 2, 2 and 3, and 1 and 3.

3. *Taylor*, **1.36** More review of 2110 kinematics problems. Got to remember the old stuff before we move on to the new stuff!

4. *Taylor*, **1.37** This is a review of free-body diagrams and basic acceleration problems from 2110. The net force on the puck must be directed down the slope. Find its acceleration and solve for the it takes to come back to $x = 0$.

5. *Taylor*, **1.45** Take

$$\frac{d(r^2)}{dt} = \frac{d(\mathbf{r} \cdot \mathbf{r})}{dt}$$

6. *Taylor*, **2.8** Look over the (easy) theorem in Problem 2.7 and just follow the formula for the $F(v)$ that is given. The answer for $v(t)$ is not an exponential, but a power law of sorts. At alrge t, v goes like $1/t^2$.

7. *Taylor*, **2.17** This is fairly simple algebra. Use (2.36a) directly in the first term of (2.36b) and from (2.36a) solve for t in terms of x then use that result in the second term of (2.36b).
(2.37) then comes out pretty directly.

8. *Taylor*, **2.19** The first part has you re-derive the 2110 result, which you probably should (don't just look it up) because you don't teach it every year like I do. Express the result (that is, y as a function of x) in terms of v_{x0} and v_{y0}.

For the second part, use the Taylor expansion of $\ln(1 - \epsilon)$ for small ϵ given in (2.40) in the second term of (2.37). (Why is this expansion valid for the limit we are considering?)