This is not a test, but is designed to help you review a few of the mathematics skills needed for Physics 7B, and so we can get an idea of the level of your ability. Be sure to show all your work. There is paper available at the front of the room. You may use a calculator if you really need to. Be sure to print your name on your paper so we can tell who you are.

1. **Algebra:** If \(5x + 20 = 30\), solve for \(x\).

2. **More algebra:** If

   \[
   y - 2z = 8 \\
   y + z = 2
   \]

   one way: subtract 2nd equation from 1st to get

   \[-3z = 6 \rightarrow \boxed{z = -2}\]

   then substitute for \(z\) in 2nd equation: \(y - 2 = 2\) \(\rightarrow \boxed{y = 4}\)

   Solve Eqs. 1 for \(y\) and \(z\).

3. **Trigonometry:** For the triangles below, tell me what the values of \(h\) and \(x\) are:

   \[
   h \sin 30^\circ = 4; \quad \sin 30^\circ = \frac{1}{2},
   \]

   \(\text{so } h = 8\)

   \[
   10 \cos 60^\circ = x; \\
   \cos 60^\circ = \frac{1}{2},
   \]

   \(\text{so } x = \frac{10}{2} = 5\)

   \(\text{It is helpful to recall that } \sin 30^\circ = \cos 60^\circ = \frac{1}{2} \text{ and that }\)

4. **More trigonometry:** For this triangle, tell me what the values of \(h\) and \(\theta\) are:

   \[
   h^2 = 8^2 + 6^2 = 64 + 36 = 100
   \]

   \(\text{so } h = 10\)

   \[
   -\tan \theta = \frac{8}{6} = \frac{4}{3}
   \]

   \(\theta = \arctan \left(\frac{4}{3}\right) \approx 53^\circ\)

5. **Graphs:** Sketch a rough graph showing \(f(x)\) vs \(x\) for \(f(x) = e^x\) and for \(f(x) = e^{-x}\). Be sure to include negative values of \(x\). You may put both on the same set of axes.

6. **More graphs:** Sketch a rough graph showing \(z\) vs \(y\) for Eqs. 1 in Problem 2. Put both lines on the same set of axes. If you have done it correctly you should be able to verify your answers to Problem 2.
(e ≈ 2.718)

Note labels on axes are important.

This is where the two equations are simultaneously satisfied, and confirms our results for Problem 2.