HOMEWORK #2

NOTES:

- This homework is due by the beginning of class on Feb 11. It covers material from chapter 3.

- You will need a calculator and lots of scrap paper.

- Answers are to be recorded on a scantron that you will turn in. You may keep the questions (i.e., these sheets).

- You may (should) use your book. You may even work with other students. However, you should not copy the answers of other students. The homeworks are exam prep, and so you need to be able to work these problems yourself. If you do not apply yourself and do your own work, you are not likely to perform well on the exams.

1. Vector $\vec{A}$ is 3 m long and vector $\vec{B}$ is 8 m long. The length of the sum of the vectors must be: (Hint: draw a picture.)

   a. 11 m.
   b. 8 m.
   c. 5 m.
   d. some value from 5 m to 11 m.

2. The following force vectors act on an object: i) 50.0 newtons at 40.0° north of east and ii) 35.0 newtons at 30.0° south of east. Which of the following represents the magnitude of the resultant and its angle relative to the easterly direction?

   a. 70.1 newtons 12.0°
   b. 16.9 newtons 82.1°
   c. 93.3 newtons 61.8°
   d. 21.2 newtons 33.3°

3. A baseball is thrown by the center fielder (from shoulder level) to home plate where it is caught (on the fly at an equal shoulder level) by the catcher. At what point is the ball's speed at a minimum? (air resistance is negligible)

   a. just after leaving the center fielders hand
   b. just before arriving at the catchers mitt
   c. at the top of the trajectory
   d. speed is constant during entire trajectory

4. A stone is thrown with an initial speed of 15 m/s at an angle of $57°$ above the horizontal from the top of a 30 m building. If $g = 9.8$ m/s^2 and air resistance is negligible, then what is the magnitude of the vertical velocity component of the rock as it hits the ground?

   a. 27.3 m/s
   b. 41 m/s
   c. 62 m/s
   d. 12 m/s

5. The highest mountain on Mars is Olympus Mons, rising 22,000 meters above the Martian surface. If one were to throw an object horizontally off the mountain top at a speed of $v_{0,x} = 30$ m/s, how fast would the ball be moving just before striking the ground? (Ignore atmospheric drag forces and use $g_{\text{Mars}} = 3.72$ m/s^2.)

   a. 130 m/s
   b. 229 m/s
   c. 355 m/s
   d. 406 m/s

6. A boat travels upstream and after one hour has gone 8 km. The boat next travels downstream and after one hour has gone 14 km. If the boats speed relative to the water is constant, what is the speed of the current in the river?

   a. 1 km/h
   b. 2 km/h
   c. 3 km/h
   d. 4 km/h

7. A projectile is fired from ground level with an initial speed $v_0 = 30$ m/s at an angle of $\theta_0 = 65°$ above the horizontal. Determine the range.

   a. 70 m
   b. 41 m
   c. 23 m
   d. 88 m

8. An object is fired from ground level toward a short cliff. If the projectile is shot with an intial speed of $v_0 = 60$ m/s, and the cliff has a height of $\Delta y = 75$ m above the ground, at what angle above the horizontal should the object be shot so it just barely makes it onto the cliff?

   a. 3.1°
   b. 40°
   c. 67°
   d. 23°