Fermi, Enrico

**Section 1**

**Written Assignment:** Write up your solutions to problems 14, 15, 16, and 17 below.

1. [1pt] Let \( a = 39.2 \) and let \( b = 39.3 \). What is \( a + b \)?
2. [1pt] What is \( a - b \)?
3. [1pt] What is \( a^2 + b^2 \)?

4. [1pt] A basketball player throws the ball at a \( 37^\circ \) angle above the horizontal to a hoop which is located a horizontal distance \( L = 5.4 \) \( m \) from the point of release and at a height \( h = 2.7 \) \( m \) above it. What is the required speed if the basketball is to reach the hoop?

5. [1pt] The position of a particle as a function of time is shown in the figure. What is the particle's average velocity between time \( t = 0.8 \) \( s \) and time \( t = 7.4 \) \( s \)?

6. [1pt] What is the average speed of the particle between time \( t = 0.8 \) \( s \) and time \( t = 7.4 \) \( s \)?

7. [2pt] The path of a very small satellite \( S \) in an elliptical orbit around a massive spherical planet \( P \) is shown in the figure below. The distance from 3 to 4 is the same as from 4 to 5, 9 to 10, and 10 to 11.

Select T-True, F-False, G-Greater than, L-Less than, E-Equal to. If the first is T and the rest F enter TFFFFFTFF.

A) The magnitude of the force on \( S \) at '1' is .... at '5'.

B) The PE of \( S \) varies with position.

C) \( S \) has its minimum speed at '10'.

D) The total PE + KE of \( S \) at '3' is .... that at '7'.

E) The speed of \( S \) at position '2' is .... at '8'.

F) For the orbit of \( S \) shown, \( P \) could be located at X.

G) The torque exerted on \( S \) varies with position.

8. [2pt] When the satellite is at position '4', its speed is \( 4.40 \times 10^2 \) \( m/s \). Assume that the picture above is to scale and find the speed of the satellite when it passes position '10'.

9. [2pt] Following is the sky chart for Lansing for 9:00pm January 19, 1998. The chart was generated by the program SkyView 3.0. The chart shows most of the brightest stars you should be able to see on a clear night on campus (that is stars with magnitude greater than 3.5). Match each letter with the appropriate star.

10. [2pt] You wish to make a round trip from Earth in a spaceship, traveling at a constant speed in a straight line for 380 days and then returning at the same constant speed. You wish further, on your return, to find Earth as it will be 1300 years in the future. How fast must you travel? (Note: You must supply at least 9 significant figures for this problem.)

11. [2pt] Does it matter if you travel in a straight line on your journey? If, for example, you traveled in a circle for 760 days, would you still find that 1300 years later had elapsed by Earth clocks when you returned?

12. [3pt] An event occurs in system \( S' \) at \( x' = 2.3 \) \( m \), \( y' = 1.8 \) \( m \), \( z' = 3.6 \) \( m \), and \( t' = 0 \). System \( S' \) and \( S \) have their axes coincident at \( t = t' = 0 \), and \( S' \) moves along the \( x \)-axis of system
S with a speed of 0.86c. What are the spacetime coordinates of the event in the system S? Express your answer in the order x, y, z, t.