

**Physics 123 – Spring 2013 – Problem Set 2 – Due January 31, 2013**

1. 36-15
2. 36-35
3. 36-37
4. 36-40
5. 36-41
6. 36-43
7. 36-52
8. 36-53
9. Evaluate

$$\begin{bmatrix} -2 & 4 & 3 \\ 12 & -5 & 1 \end{bmatrix} \cdot \begin{bmatrix} 5 & 6 & -1 \\ 10 & 3 & 8 \\ 7 & 2 & 1 \end{bmatrix}$$

10. What is the Lorentz transformation matrix that transforms spacetime coordinates in reference frame S to a reference frame S' moving at 0.8c in the +x direction relative to frame S? Determine the coordinates in S' for an event that occurs in S at x=3 , y = -2, z=10, ct = 7 using the transformation matrix method. Assume units of meters and seconds.
11. Two event in frame S occur at coordinates give by spacetime 4-vectors A = (x<sub>0</sub>=5 , x<sub>1</sub>=3 , x<sub>2</sub>=6 , x<sub>3</sub>= -2 ) and B = (x<sub>0</sub>=2 , x<sub>1</sub>=300 , x<sub>2</sub>=4 , x<sub>3</sub>= -220 ), respectively. Determine the invariant interval between these two events. (units in meters and seconds)