Physics 262: Practice Exam for Exam 2
100 points

1. Problem 1 (10 points)
   (a) (5 pts) State the Principle of Relativity
   (b) (5 pts) State the Principle of Equivalence
2. Problem 2 (20 points)
   (a) (10 pts) Draw a Minkowski Diagram and show two events, P1 and P2, that have a spacelike separation in the un-primed frame.
   (b) (5 pts) Do they still have a spacelike separation in the primed frame?
   (c) (5 pts) Use the Diagram to show the order of events in each frame.
3. Problem 3 (20 points)
   A Laser on the earth's surface that produces 600 nm light is pointed to outer-space. What is the wavelength of that light when detected far from earth or any other large masses?
4. Problem 4 (20 points) As seen from earth, two spaceships are seen to be traveling in opposite directions, both with v=0.9c. How fast is the second spaceship traveling as seen from the first spaceship?
5. Problem 5 (30 points) In the rest frame of a wire, there is current I flowing through the wire, but no net charge. See Figure below. At a point R above the wire (z=R):
   (a) (5 pts) What is $\vec{E}$ in the rest frame of the wire?
   (b) (5 pts) What is $\vec{B}$ in the rest frame of the wire?
   (c) (5 pts) In the frame where the wire is moving in the x-direction with velocity V, what is $\vec{E}$ at z=R?
   (d) (5 pts) In the frame where the wire is moving in the x-direction with velocity V, what is $\vec{B}$ at z=R?