Physics 262: Exam 2
100 points

1. (30 points) The Borg are heading towards Earth. When their ship is at rest, it has the shape of a perfect cube. It is oriented such that the normal to one of its cube faces is in the direction of travel. It is moving at a speed that makes the ship's volume look to be half of its rest volume. In the Earth's frame, Mars is located 10^8 km from earth. From the Borg's perspective, how long does it take to travel from Mars to earth?

2. (30 points) Light is incident on a diffraction grating. The angle between intensity maxima for red (650 nm) and blue (450 nm) in the first order is $\pi/100$. Calculate the number of slits per mm.

3. (20 points) Estimate how fast must you be going for a red (650 nm) stop light to look green (550 nm).

4. (10 points) Describe the Michelson-Morley experiment and it's significance.

5. (5 points) Draw a Minkowski diagram for the case when the S' frame is moving in the positive x-direction. Draw events that are separated by space-like, light-like and time-like intervals.

6. (5 points) Explain Rayleigh's Resolution criterion and when it applies.