

## Physics 201, Fall 2009

### Midterm Exam 1

October 5, 2009 10-10:50 am

Write your name on each page of paper submitted. You must show all work to receive credit, but only turn in work you would like graded. This exam is closed book. You may not use any electronic devices or written notes. Good luck!

#### Possibly Useful Formulae:

$$t' = \gamma(t - vx/c^2)$$

$$x' = \gamma(x - vt)$$

$$y' = y$$

$$z' = z$$

$$E^2 = \mathbf{p}^2 c^2 + m^2 c^4 \quad E = mc^2 \gamma \quad \mathbf{p} = m\mathbf{u}\gamma$$

$$u'_x = \frac{u_x - v}{1 - u_x v / c^2}$$

$$u'_y = \frac{u_y}{\gamma(1 - u_x v / c^2)}$$

$$u'_z = \frac{u_z}{\gamma(1 - u_x v / c^2)}$$

$$f_{obs} = \sqrt{\frac{1 \pm \beta}{1 \mp \beta}} f_{src}$$