Astronomy 103
Midterm 3
April 23, 2014

Instructions:

No books, notes or calculator are allowed. You have 50 minutes to complete the exam, and please do not turn to the next page until instructed to do so.

You may find the following information helpful:

- 1 AU $= 3 \times 10^8$ km

- speed of light $= 3 \times 10^8$ m/s

- Kepler's 3rd law:
$$a^3 = P^2$$
  with the period P in years and semi-major axis a in AU.

- Newton's law of gravity:
$$F = \frac{GMm}{r^2}$$

- Peak wavelength and temperature of blackbody radiation:
$$\lambda = \frac{3 \times 10^6}{T} \text{ nm}$$
  with wavelength λ in nm (1 nm = 10^{-9} m) and temperature T in Kelvin.

- Conversion of mass into energy: $E = mc^2$

- Relationship between brightness B and distance d:
$$B_2 = B_1 \times \frac{d_1^2}{d_2^2}$$

- Relationship between luminosity L, temperature T and radius R of stars:
$$L = 4\pi\sigma T^4 R^2$$
  where $4\pi\sigma$ are constants.