homework 1

1. $P^2 = R^3 \Rightarrow R \approx 2.543\ AU$

$$\begin{cases} 2\pi r = vT \\ \frac{R}{r} = \frac{M_S}{M} \end{cases} \Rightarrow M \simeq 1.6 M_J$$

2. $$\begin{cases} 2\pi r = vT \\ \frac{R}{r} = \frac{M_S}{M_E} \end{cases} \quad T = 1a \quad R = 1AU \Rightarrow v = 0.089 m/s$$

可利用恒星光度的变化测到其存在

3. $0.021 = \frac{S_0}{S} = \frac{d^2}{D^2} \Rightarrow d \simeq 2.32 \times 10^5 km$

$$\frac{\rho}{\rho_0} = \frac{\frac{M}{V}}{\frac{M_0}{V_0}} = \frac{M}{M_0} \cdot \left(\frac{R_0}{R}\right)^3 \qquad \rho \simeq 0.144 \rho_{地}$$

homework 2

1. $T_2^4 = T_1^4 \cdot \left(\frac{1}{5}\right)^2 \Rightarrow T_2 \simeq 134.104 K$

2. $\lambda_{max} = \frac{2.897 \times 10^{-3}}{T} \Rightarrow \frac{T_1}{T_2} = \frac{500}{750} = \frac{2}{3}$

$E = \sigma A T^4 \Rightarrow \frac{E_1}{E_2} = \frac{16}{81} \times 3^2 = \frac{16}{9}$

$\frac{T_3^4}{T_4^4} = \frac{E_1}{E_2} \cdot \frac{r_2^2}{r_1^2} \Rightarrow T_3 \simeq 86.6 K$