3) a)

$$V = -\frac{GM^2}{R}$$

$G = \frac{2}{3}\, 10^{-7}$ dyne cm^2 g^{-2}
$M = 2 \cdot 10^{33}$ g
$R_\odot = 7 \cdot 10^{10}$ cm

$$V = -\frac{\frac{2}{3}\, 10^{-7}\; 4 \cdot 10^{66}}{7 \cdot 10^{10}} \quad \frac{\text{dyne cm}^2\, \cancel{g^2}\, \cancel{g^2}}{\cancel{cm}}$$

$$= -\frac{8}{21}\, 10^{49} \text{ dyne cm}$$

$$\simeq -0.38 \cdot 10^{49} \text{ ergs.}$$

b) Thermal kinetic energy $= \frac{1}{2}|U| = 0.2\; 10^{49}$ ergs

$$E = 0.2 \cdot 10^{49} \text{ ergs} = \frac{3}{2} N k_B T$$

$$\Rightarrow T = \frac{\frac{4}{3} \cdot 10^{48} \text{ ergs}}{k_B \cdot 10^{57}} \qquad k_B = 1.38 \cdot 10^{-16} \frac{\text{ergs}}{K}$$

$$\Rightarrow T \simeq \frac{10^{48}}{10^{57} \cdot 10^{-16}}\, K \simeq \underline{\underline{10^7 K}}$$

Radiation leads $\sim \underline{\underline{10^8 K}}$.