

## PHY2009: Answers to problems: Lectures 16 to 18

- 1) (a)  $1.32 \times 10^{28} \text{ m}^{-3}$   
(b)  $2.04 \text{ eV}$   
(c)  $0.0190$   
(d)  $0.019 \times 3k_B/2$   
(e)  $v_F = 8.46 \times 10^5 \text{ ms}^{-1}$ ;  $v_{th} = 1.2 \times 10^5 \text{ ms}^{-1}$ ;  $v_{drift} = 0.0077 \text{ ms}^{-1}$
  
- 2)
  
- 3) For  ${}^3\text{He}$ ,  $E_F = 6.77 \times 10^{-23} \text{ J}$ ,  $T_F = 4.9 \text{ K}$   
For a neutron star,  $E_F = 4.85 \times 10^{-12} \text{ J}$ ,  $T_F = 3.51 \times 10^{11} \text{ K}$
  
- 4)  $n = 1.79 \times 10^{29} \text{ m}^{-3}$ ;  $m^* = 8.79 \times 10^{-31} \text{ kg}$ ;  $mfp = 13.4 \text{ nm}$ ;  
 $v_{drift} = 1.16 \text{ ms}^{-1}$