

9.21) The Fermi Energy can be defined as the energy at which $F_{FD} = 0.5$. Using this, show that B_1 in

$$F_{FD} = \frac{1}{B_1 e^{E/kT} + 1} \quad (9.30)$$

is $B_1 = e^{-E_F/kT}$ AND RE-WRITE (9.30) AS (9.34)

SETTING $F_{FD} \Big|_{E=E_F} = 0.5$

$$\frac{1}{B_1 e^{E_F/kT} + 1} = 0.5 = \frac{1}{2}$$

$$B_1 e^{E_F/kT} + 1 = 2$$

$$B_1 e^{E_F/kT} = 1$$

$$\boxed{B_1 = e^{-E_F/kT}} \quad \text{YEP! THIS WORKS}$$

SUBSTITUTE BACK INTO (9.30)

$$F_{FD} = \frac{1}{e^{-E_F/kT} e^{E/kT} + 1}$$

$$\boxed{F_{FD} = \frac{1}{e^{(E-E_F)/kT} + 1}} \quad (9.34) \quad \underline{\underline{QED!}}$$