Q1. $m_A^* = 0.48\, m_0$; $m_B^* = 0.048\, m_0$

Q2. $g(E) = \frac{1}{\hbar}\sqrt{\frac{0.067 m_0}{2E}}$

Q3. $g(E) = \frac{4\pi \cancel{2m} (2 m_n^*)^{3/2}}{h^3} \left(\frac{2}{3}\right)(2kT)^{3/2}$

for Si (a) $m_n^* = 1.08\, m_0$ for T = 300k & 400k

for Ge (b) $m_n^* = 0.067\, m_0$ for T = 300k & 400k

Q4. $g(E) = \frac{4\pi (2 m_p^*)^{3/2}}{h^3}\left(\frac{2}{3}\right)(3kT)^{3/2}$

For Si (a) $m_p^* = 0.56\, m_0$ for T = 300k & 400k

for Ge (b) $m_p^* = 0.48\, m_0$ for T = 300k & 400k

Q5. $E_F = \frac{E_c + E_v}{2}$

Q6. ~~$E_F = 9.40$ eV~~ $9.40\text{eV} < E_F < 12.8\text{eV}$

Q7. @ T = 0k : $E_F = 2.53$ eV

Q8. $f(E) = \begin{cases} 0.999 & \text{for Si} \\ 0.999 & \text{for Ge} \\ 1 & \text{for GaAs} \end{cases}$

Q9. 1.11%

Q10.