9. (a) At absolute temperature $T = 0$, the probability is zero that any state with energy above the Fermi energy is occupied.

(b) The probability that a state with energy E is occupied at temperature T is given by

$$P(E) = \frac{1}{e^{(E-E_F)/kT} + 1}$$

where k is the Boltzmann constant and E_F is the Fermi energy. Now, $E - E_F = 0.062\,\text{eV}$ and $(E - E_F)/kT = (0.062\,\text{eV})/(8.62 \times 10^{-5}\,\text{eV/K})(320\,\text{K}) = 2.248$, so

$$P(E) = \frac{1}{e^{2.248} + 1} = 0.0956 \ .$$

See Appendix B or Sample Problem 42-1 for the value of k.