ECE 3040
HW #1 - Solutions

1.6(a)
1, 3, 1
normalized intercepts

1/3, 1
\text{intercepts}

3, 1, 3
reduction to lowest whole-number set

(3\overline{1}3)
Miller index notation for plane.

(iii) The normal to the plane in the cubic crystal system has the same Miller indices as the plane.

\begin{bmatrix} 3 & 1 & 3 \end{bmatrix}

1.6(b)
1, 1, \frac{1}{2}
normalized intercepts

1 1 2
\text{intercepts}

1 1 2
lowest whole number set

(1\overline{1}2) \leftrightarrow \text{Miller indices of plane}

(iii) [0 0 1]

(Assume vector has length \(a\). Its projections along the \(x, y, z\) axes are 0, 0, \(a\). Reducing to the lowest possible whole number set gives [0 0 1]
1.11)
   a) Simple cubic lattice
   b) unit volume = $a^3$
      \# of atom in unit cell = 1
   c) number of atoms/unit volume = $\frac{1}{a^3}$
   Atom positioning for (110) surface plane.
      \[ a \text{ atoms/unit area} = \frac{1}{(a\sqrt{2})a} = \frac{1}{a^2\sqrt{2}} \]
   d) \[
   \begin{array}{c}
   \begin{array}{c}
   .
   .
   \\
   .
   .
   \\
   \\
   \\
   \\
   \end{array}
   \end{array}
   \]