5(i)

let $p(x) = x^3 - 2x^2 - x + 2$

possible zeros are $\pm 1, \pm 2$

$p(1) = 1^3 - 2 \times 1^2 - 1 + 2$

$= 1 - 2 - 1 + 2$

$= 3 - 3$

$= 0$

$\therefore$ $x - 1$ is a factor of $p(x)$ by factor theorem

$$
\begin{array}{r|l}
 & x^2 - x - 2 \\
x - 1 & x^3 - 2x^2 - x + 2 \\
 & \cancel{x^3} - x^2 \\
 & \quad - \quad + \\
\hline
 & -\cancel{x^2} - x + 2 \\
 & -x^2 + x \\
 & \quad + \quad - \\
\hline
 & -\cancel{2x} + \cancel{2} \\
 & -2x + 2 \\
 & \quad + \quad - \\
\hline
 & 0
\end{array}
$$

$\therefore p(x) = (x-1)(x^2 - x - 2)$

$= (x-1)(x^2 - 2x + x - 2)$

$= (x-1)[x(x-2) + 1(x-2)]$

$= (x-1)(x+1)(x-2)$

$= (x-2)(x-1)(x+1)$

5(ii) let

$p(x) = x^3 - 3x^2 - 9x - 5$

possible zeros are $\pm 1, \pm 5$

$p(-1) = (-1)^3 - 3(-1)^2 - 9(-1) - 5$

$= -1 - 3 + 9 - 5$

$= 9 - 9$

$= 0$

$\therefore$ $x + 1$ is a factor of $p(x)$ by factor theorem

$$
\begin{array}{r|l}
 & x^2 - 4x - 5 \\
x + 1 & x^3 - 3x^2 - 9x - 5 \\
 & \cancel{x^3} + x^2 \\
 & \quad - \quad - \\
\hline
 & -4\cancel{x^2} - 9x - 5 \\
 & -4x^2 - 4x \\
 & \quad + \quad + \\
\hline
 & -5\cancel{x} - \cancel{5} \\
 & -5x - 5 \\
 & \quad + \quad + \\
\hline
 & 0
\end{array}
$$

$p(x) = (x+1)(x^2 - 4x - 5)$

$= (x+1)(x^2 - 5x + x - 5)$

$= (x+1)[x(x-5) + 1(x-5)]$

$= (x+1)(x-5)(x+1)$

$= (x+1)(x+1)(x-5)$