

## Algebra & Vectors Test

1. Find the remainder when  $x^3 - 3x^2 + 2x + 1$  is divided by  $x^2 + 2x - 1$ .
2. (a) Expand  $(4 + 2x)^{\frac{1}{2}}$  up to and including the  $x^3$  term.  
(b) For what values of  $x$  is the expansion valid?
3. Find the angle between the lines

$$r = \begin{pmatrix} 3 \\ 2 \\ 1 \end{pmatrix} + \lambda \begin{pmatrix} -1 \\ 1 \\ 2 \end{pmatrix} \quad \text{and} \quad r = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} + \mu \begin{pmatrix} 1 \\ 2 \\ 4 \end{pmatrix}.$$

4. Find the vector form of the line  $y = 2x + 3$ .
5. Find the vector equation of the line through  $A(1, 2, 5)$  and  $B(2, 7, -1)$ .
6. Find the point three quarters of the way along from  $A(0, 1, -3)$  to  $B(4, 2, -6)$ .
7. Using partial fractions, split  $\frac{x - 8}{6x^2 - x - 1}$  into two terms.
8. Using partial fractions, split  $\frac{6x^2 + 11x - 8}{(x + 2)^2(x - 1)}$  into three terms.
9. Find the quotient & remainder when  $x^4$  is divided by  $x^2 + 1$ .