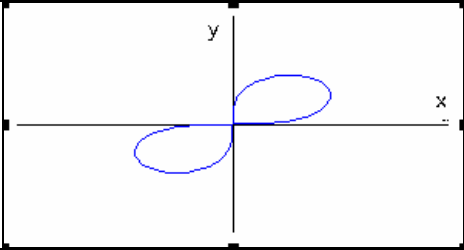


**July 2003 Intake Paper 1 (FM1) [Examination date: 3 September 2004]**

1.	$a = 30$ , $b = 14$ , $c = -3$ , $d = -1$
2.	$y = x + a - 3$ , $x = -3$
3.	$\left\{ \begin{pmatrix} 2 \\ 45 \\ -49 \end{pmatrix}, \begin{pmatrix} 13 \\ 7 \\ -14 \end{pmatrix} \right\}$
4.	$\lambda_1 = 1, \mathbf{e}_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$ ; $\lambda_2 = 3, \mathbf{e}_2 = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$ ; $\lambda_3 = 4, \mathbf{e}_3 = \begin{pmatrix} 5 \\ 3 \\ -3 \end{pmatrix}$ ; $\mathbf{Q} = \begin{pmatrix} 1 & 1 & 5 \\ 0 & 1 & 3 \\ 0 & 0 & -3 \end{pmatrix}$ ; $\mathbf{D} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 243 & 0 \\ 0 & 0 & 1024 \end{pmatrix}$
5.	$\frac{28}{15}$
6.	$-2$
7.	a) $m = 3$
8.	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;">b)</div>  <div style="margin-left: 20px;">c) <math>\sqrt{2}</math></div> </div>
9.	b) $\frac{1}{\theta} \sec \theta - \frac{4}{\theta^3} \sec \theta + \frac{2}{\theta} \sec^3 \theta$
10.	$\sin^6 \theta = \frac{-1}{32} \cos 6\theta + \frac{3}{16} \cos 4\theta - \frac{15}{32} \cos 2\theta + \frac{5}{16}$ ; $\frac{5}{16} - \frac{11}{12\pi}$
11.	b) $\begin{pmatrix} 3 \\ 4 \\ -5 \end{pmatrix}$ ; c) 6
12E.	a) $\frac{14}{3}$ ; b) $\frac{5\sqrt{3}}{8}$
12O.	$A = -4.901 \times 10^9$ ; $B = 1.590 \times 10^9$ ; $1.874 \times 10^9$