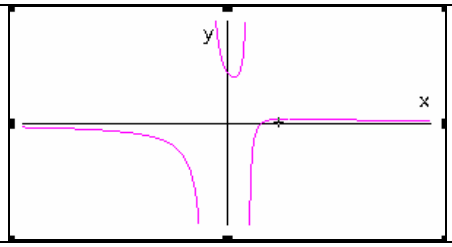
July 2004 Intake Paper 1 (FM1) [Examination date: 24 August 2005]

1.	1629450
2.	$2cis\left(\frac{-\pi}{10}\right); 2cis\left(\frac{3\pi}{10}\right); 2cis\left(\frac{7\pi}{10}\right); 2cis\left(\frac{-\pi}{2}\right); 2cis\left(\frac{-9\pi}{10}\right)$
3.	$\sin\frac{k\pi}{15}$, $k=1,2,4,5,7$
4.	i) $(x+1)e^x; (x+2)e^x; (x+3)e^x$; (ii) $(x+n)e^x$
5.	i) $\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ \frac{-1}{a} & 0 & \frac{1}{a} \end{pmatrix}$; (ii) $\begin{pmatrix} 1 & -1 & -1 \\ 1 & -2 & \frac{-3}{2} \\ \frac{-1}{a} & \frac{1}{a} & \frac{3}{2a} \end{pmatrix}$
6.	$4a$ unit
7.	i)  (ii) $\frac{2\sqrt{3}}{9}a$
8.	i) $(11-2a)\mathbf{x}+(10+5a)\mathbf{y}-25\mathbf{z}+25a=0$ (ii) $a=-132$
9.	i) $x=\pm1, y=0$ ii) Min. $\left(\frac{1}{3}, 4\frac{1}{2}\right)$; Max. $\left(3, \frac{1}{2}\right)$ 
10.	i) 2 (ii) 2 ; $\left\{\begin{pmatrix} 2 \\ 4 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} -1 \\ 2 \\ 0 \\ 1 \end{pmatrix}\right\}$ (iii) $\begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}+\lambda\begin{pmatrix} 2 \\ 4 \\ 1 \\ 0 \end{pmatrix}+\beta\begin{pmatrix} -1 \\ 2 \\ 0 \\ 1 \end{pmatrix}$
11.	$\lambda_1=1, \mathbf{e}_1=\begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}$; $\lambda_2=3, \mathbf{e}_2=\begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$; $\lambda_3=5, \mathbf{e}_3=\begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$; $\mathbf{P}=\begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}$; $\mathbf{D}=\begin{pmatrix} (1-k)^n & 0 & 0 \\ 0 & (3-k)^2 & 0 \\ 0 & 0 & (5-k)^n \end{pmatrix}$
12E.	$A\cos 3x^2+B\sin 3x^2-\frac{2}{3}$
12O.	$\left(\frac{2e-5}{e-2}, \frac{e^2-5}{8e^2-16e}\right)$