P425/2	S6 **NUMERICAL METHODS**	
	Time : 1 hour	

1	Use trapezium rule with 5 strips to evaluate $\int_0^{\frac{\pi}{2}} \frac{1}{1+sinx} dx$, correct to four decimal places.	*05marks*
2	(a) Use the trapezium rule with 6 ordinates to estimate the value of $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} tanx \ dx$, correct to 3 significant figures.	*06marks*
	(b) (i)Calculate the percentage error in your estimation in (a) above . (ii) suggest how the percentage error above may be reduced.	*06marks*
3	The table below is an extract from the tables of $cosx°$ <table><tr><td>$x = 80°$</td><td>$0'$</td><td>$10'$</td><td>$20'$</td><td>$30'$</td><td>$40'$</td></tr><tr><td>$cosx$</td><td>0.1736</td><td>0.1708</td><td>0.1679</td><td>0.1650</td><td>0.1622</td></tr></table> Use linear interpolation to estimate (a) $cos \ 80° \ 36'$ (b) $cos^{-1}0.1685$	*05marks*
4	Show that the equation $lnx = 2 - x$ has a root between $x = 1$ and $x = 2$. Hence use linear interpolation only once to find the root correct to 2 decimal places.	*05marks*
5	A cylindrical pipe has a radius of 2.5cm measured to the nearest unit. If the absolute relative error in calculating its volume is 0.125, find the absolute relative error in measuring its height;	*05marks*

6	(a) Given that Δx and Δy are the errors made in approximating x and y to given numbers of decimal places respectively
	 respectively. Show that the maximum absolute error in $\frac{y}{x^2}$ is
	 $2\left\lvert\frac{y\Delta x}{x^3}\right\rvert + \left\lvert\frac{\Delta y}{x^2}\right\rvert$.
	 (b) hence find the
	    (i) limits within which the exact value of $\frac{0.74}{1.6^2}$
	    (ii) percentage error made in $\frac{0.74}{1.6^2}$. give your answers to 3sf
		12marks