

Question		Answer	Marks	AOs	Guidance	
10	(a)	$\sin 2x \approx 2x$ or $\sin x \approx x$ used $\int \left(\frac{1}{x}\right) dx$ or $\int \left(\frac{1}{x} - x\right) dx$ obtained <b>oe nfw</b> $F[x] = \ln x$ <b>oe</b> or $F[x] = \ln x - \frac{1}{2} x^2$ <b>oe</b>  $\ln(0.05) - \ln(0.01) = \ln 5$ <b>oe</b> or $\ln(0.05) - \ln(0.01) + 0.0012 \approx \ln 5$ <b>oe</b>	<b>M1</b>  <b>A1</b>  <b>A1</b>  <b>A1</b>  <b>[4]</b>	<b>3.1a</b>  <b>1.1</b>  <b>1.1</b>  <b>3.2a</b>	may see $\cos x \approx 1 - \frac{x^2}{2}$  intermediate step needed from here to earn final mark	
10	(b)	differentiation of <i>their</i> $\frac{1}{x}$  substitution of 0.01 and $-10\,000$ correctly obtained	<b>M1</b>  <b>A1</b>  <b>[2]</b>	<b>2.1</b>  <b>1.1</b>	or differentiation of $y$ using quotient rule and use of small angle approximation  from $-\frac{1}{x^2}$ or $-\frac{1}{x^2} - 1$ <b>oe</b>	
10	(c)	$4.54066 \times 10^{-6}$ or 0.00000454066 <b>cao</b>  (no sign change for 6 dp), but sign change for 5 dp or last two iterates agree to 5dp  0.94775	<b>B1</b>  <b>E1</b>  <b>B1</b>  <b>[3]</b>	<b>2.5</b>  <b>3.1a</b>  <b>3.2a</b>	allow sign change between 0.947745 and 0.9477475	