I3 WITH RCOS MARKING SCHEME

1 **(i)** State answer $R = 2$ — B1
Use trig formula to find α — M1
Obtain $\alpha = \frac{1}{3}\pi$, or 60° — A1 **3**

[For the M1 condone a sign error in the expansion of $\cos(\theta - \alpha)$, but the subsequent trigonometric work must be correct.]

[SR: The answer $\alpha = \tan^{-1}(\sqrt{3})$ earns M1 only.]

(ii) State that the integrand is of the form $a\sec^2(\theta - \alpha)$ — M1
State correct indefinite integral $\frac{1}{4}\tan(\theta - \frac{1}{3}\pi)$ — A1√
Use limits correctly in an integral of the form $a\tan(\theta - \alpha)$ — M1
Obtain given answer correctly following full and exact working — A1 **4**

[The f.t. is on R and α.]

2 **(i)** State or imply $R = 5$ — B1
Use relevant trigonometry to find α — M1 [3]
Obtain $\alpha = 0.6435$ — A1

(ii) **(a)** Carry out appropriate method to find one value in given range — M1
Obtain 1.80 — A1
Carry out appropriate method to find second value in given range — M1
Obtain 5.77 and no other value — A1 [4]

(b) Express integrand as $k\sec^2(\theta - \text{their } \alpha)$ for any constant k — M1
Integrate to obtain result $k\tan(\theta - \text{their } \alpha)$ — A1
Obtain correct answer $2\tan(\theta - 0.6435)$ — A1 [3]

3 **(i)** State $R = 2$ — B1
Use trig formula to find α — M1
Obtain $\alpha = \frac{1}{6}\pi$ with no errors seen — A1 [3]

(ii) Substitute denominator of integrand and state integral $k\tan(x - \alpha)$ — M1*
State correct indefinite integral $\frac{1}{4}\tan\left(x - \frac{1}{6}\pi\right)$ — A1√
Substitute limits — M1 (dep*)
Obtain the given answer correctly — A1 [4]

4(i)	State answer $R = \sqrt{5}$	**B1**
	Use trig formulae to find tan	**M1**
	Obtain $\tan\alpha = 2$	**A1**
	Total:	**3**
4(ii)	State that the integrand is $3\sec^2(\theta - \alpha)$	**B1FT**
	State correct indefinite integral $3\tan(\theta - \alpha)$	**B1FT**
	Substitute limits correctly	**M1**
	Use tan($A \pm B$) formula	**M1**
	Obtain the given exact answer correctly	**A1**
	Total:	**5**