

STEP II, 2015, Q6

- 6 (i) Show that

$$\sec^2\left(\frac{1}{4}\pi - \frac{1}{2}x\right) = \frac{2}{1 + \sin x}.$$

Hence integrate $\frac{1}{1 + \sin x}$ with respect to x .

- (ii) By means of the substitution $y = \pi - x$, show that

$$\int_0^\pi xf(\sin x) dx = \frac{\pi}{2} \int_0^\pi f(\sin x) dx,$$

where f is any function for which these integrals exist.

Hence evaluate

$$\int_0^\pi \frac{x}{1 + \sin x} dx.$$

- (iii) Evaluate

$$\int_0^\pi \frac{2x^3 - 3\pi x^2}{(1 + \sin x)^2} dx.$$



NextStepMaths.com

To view mark schemes, fully worked solutions and examiner's comments, and for more details about tutoring and other services offered, go to

NextStepMaths.com