

Total marks – 120
Attempt Questions 1–8
All questions are of equal value

Answer each question in a SEPARATE writing booklet. Extra writing booklets are available.

Marks

Question 1 (15 marks) Use a SEPARATE writing booklet.

- (a) By using the substitution $u = \sec x$, or otherwise, find **2**

$$\int \sec^3 x \tan x \, dx .$$

- (b) By completing the square, find $\int \frac{dx}{x^2 + 2x + 2}$. **2**

- (c) Find $\int \frac{x \, dx}{(x+3)(x-1)}$. **3**

- (d) By using two applications of integration by parts, evaluate **4**

$$\int_0^{\frac{\pi}{2}} e^x \cos x \, dx .$$

- (e) Use the substitution $t = \tan \frac{\theta}{2}$ to find **4**

$$\int_0^{\frac{\pi}{2}} \frac{d\theta}{2 + \cos \theta} .$$