

Question 2**(14 marks)**

Let $p = \ln(2)$, $q = \ln(3)$ and $r = \ln(5)$.

(a) Express each of the following in terms of p , q and/or r .

(i) $\ln(6)$

(2 marks)

(ii) $\ln(6.25)$

(3 marks)

(iii) $\int_2^3 \frac{d}{dx} \ln(x) dx$

(2 marks)

(b) Evaluate e^{p+q} .

(2 marks)

- (c) (i) Determine $\frac{d}{dx}(x \ln(x))$. (1 mark)
- (ii) Hence show that $\int \ln(x) dx = x \ln(x) - x + c$ where c is a constant. (2 marks)
- (iii) Evaluate $\int_1^3 \ln(x) dx$ in terms of p , q and/or r . (2 marks)