



Improper Integrals Exam Questions (Edexcel)

Q1.

Evaluate the improper integral

$$\int_1^{\infty} 2e^{-\frac{1}{2}x} dx$$

(3)

(Total for question = 3 marks)

(Q02 9FM0/01, Oct 2021)

Q2.

(a) Explain why

$$\int_{\frac{4}{3}}^{\infty} \frac{1}{9x^2 + 16} dx$$

is an improper integral.

(1)

(b) Show that

$$\int_{\frac{4}{3}}^{\infty} \frac{1}{9x^2 + 16} dx = k\pi$$

where k is a constant to be determined.

(4)

(Total for question = 5 marks)

(Q03 9FM0/02, June 2024)

Q3.

Show that

$$\int_0^{\infty} \frac{8x - 12}{(2x^2 + 3)(x + 1)} dx = \ln k$$

where k is a rational number to be found.

(Total for question = 7 marks)

(Q02 9FM0/01, June 2019)



Q4.

(a) Explain why $\int_1^{\infty} \frac{1}{x(2x+5)} dx$ is an improper integral.

(1)

(b) Prove that

$$\int_1^{\infty} \frac{1}{x(2x+5)} dx = a \ln b$$

where a and b are rational numbers to be determined.

(6)

(Total for question = 7 marks)

(Q02 9FM0/01, Oct 2020)

Q5.

(i) (a) Explain why $\int_0^{\infty} \cosh x dx$ is an improper integral.

(1)

(b) Show that $\int_0^{\infty} \cosh x dx$ is divergent.

(3)

(ii) $4 \sinh x = p \cosh x$ where p is a real constant

Given that this equation has real solutions, determine the range of possible values for p

(2)

(Total for question = 6 marks)

(Q09 9FM0/01, June 2022)

Q6.

(a) Explain why $\int_0^2 \frac{2}{\sqrt[3]{2-x}} dx$ is an improper integral.

(1)

(b) Prove that

$$\int_0^5 \frac{2}{\sqrt[3]{2-x}} dx = a(\sqrt[3]{b} - \sqrt[3]{c})$$

where a , b and c are integers to be determined.

(5)

(Total for question = 6 marks)