

Integration Bee Answer Booklet

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2 hours 30 minutes

Name: _____ Date: _____

Instructions:

- This is an answer booklet. You are expected to put all your answers in here and the stages of your working in up to 5 steps.
- Your scrap working will still be marked.
- Each question is worth 5 marks.
- Should an incorrect answer have the same steps as a correct answer, you shall be awarded partial marks.
- Here is an example for the integral $\int_0^\infty \frac{x^{s-1}}{e^x - 1} dx$:

a) Expanding geometric series in e^x : $\int_0^\infty x^{s-1} \sum_{n=1}^\infty e^{-nx} dx$

b) Substituting $z = xn$: $\sum_{n=1}^\infty \frac{1}{n^s} \int_0^\infty z^{s-1} e^{-z} dz$

c) Applying Γ : $\sum_{n=1}^\infty \frac{1}{n^s} \Gamma(s)$

d) Applying ζ : $\zeta(s) \Gamma(s)$

e) (N/A)

Answer)

$$\zeta(s) \Gamma(s)$$

Information:

- This paper consists of 8 pages.
- The total mark for this paper is 100.

1. (a)

(b)

(c)

(d)

(e)

Answer)

2. (a)

(b)

(c)

(d)

(e)

Answer)

3. (a)

(b)

(c)

(d)

(e)

Answer)

4. (a)

(b)

(c)

(d)

(e)

Answer)

5. (a)

(b)

(c)

(d)

(e)

Answer)

6. (a)

(b)

(c)

(d)

(e)

Answer)

7. (a)

(b)

(c)

(d)

(e)

Answer)

8. (a)

(b)

(c)

(d)

(e)

Answer)

9. (a)

(b)

(c)

(d)

(e)

Answer)

10. (a)

(b)

(c)

(d)

(e)

Answer)

11. (a)

(b)

(c)

(d)

(e)

Answer)

12. (a)

(b)

(c)

(d)

(e)

Answer)

13. (a)

(b)

(c)

(d)

(e)

Answer)

14. (a)

(b)

(c)

(d)

(e)

Answer)

15. (a)

(b)

(c)

(d)

(e)

Answer)

16. (a)

(b)

(c)

(d)

(e)

Answer)

17. (a)

(b)

(c)

(d)

(e)

Answer)

18. (a)

(b)

(c)

(d)

(e)

Answer)

19. (a)

(b)

(c)

(d)

(e)

Answer)

20. (a)

(b)

(c)

(d)

(e)

Answer)