

231 Tutorial Sheet 1¹²

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Useful facts:

- The *iterated integral* is the integral expressed as a series of nested one-dimensional integrals.

Questions

1. Rewrite the integral

$$I = \int_0^1 dx \int_1^{e^x} dy \phi(x, y) \quad (1)$$

as a double integral with the opposite order of integration.

2. Evaluate

$$I = \int_D dx dy x e^{xy} \quad (2)$$

where D is given by $0 < x < 1$ and $2 < y < 4$.

3. Evaluate

$$I = \int_D dx dy (x + y) \quad (3)$$

where D is given by $0 < y < 1$ and $2y < x < 2$.

4. Change the order of integration of

$$I = \int_0^{1/2} dy \int_{-\sqrt{1-4y^2}}^{\sqrt{1-4y^2}} dx y \quad (4)$$

and evaluate.

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²Including material from Chris Ford, to whom many thanks.