231 Tutorial Sheet 1^{12}

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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

$$I = \int_{0}^{1} dx \int_{1}^{e^{x}} dy \ \phi(x, y)$$
 (1)

as a double integral with the opposite order of integration.

2. Evaluate

$$I = \int_{D} dx dy x e^{xy} \tag{2}$$

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

3. Evaluate

$$I = \int_{D} dx dy (x+y) \tag{3}$$

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

4. Change the order of integration of

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

and evaluate.

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 $^{^2 {\}rm Including}$ material from Chris Ford, to whom many thanks.