231 Tutorial Sheet 1[1][2]

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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
$$I = \int_0^1 dx \int_1^{e^x} dy\ \phi(x, y) \tag{1}$$
as a double integral with the opposite order of integration.

2. Evaluate
$$I = \int_D dxdyxe^{xy} \tag{2}$$
where D is given by $0 < x < 1$ and $2 < y < 4$.

3. Evaluate
$$I = \int_D dxdy(x + y) \tag{3}$$
where D is given by $0 < y < 1$ and $2y < x < 2$.

4. Change the order of integration of
$$I = \int_0^{1/2} dy \int_{-\sqrt{1-4y^2}}^{\sqrt{1-4y^2}} dxy \tag{4}$$
and evaluate.

[1] Conor Houghton, `houghton@maths.tcd.ie`, see also `http://www.maths.tcd.ie/~houghton/231`
[2] Including material from Chris Ford, to whom many thanks.