Iterated Integrals

For problems 1 – 3 evaluate the following integrals.

1. $\int_0^{-3}\int_0^2 15x^4y^5\sin\left(x^5y^3\right)dxdy$

2. $\iint\limits_R \cos^2\left(2x\right)+\frac{7yx}{3y^2+1}\,dA,\qquad R=\left[0,2\right]\times\left[-1,0\right]$

3. $\iint\limits_R x\mathbf{e}^{x-2y}\,dA,\qquad R=\left[0,2\right]\times\left[-1,3\right]$

Double Integrals over General Regions

For problems 4 – 6 evaluate the following integrals.

4. $\int_0^3\int_{x^2}^{1-x} 8x-y^2-2\,dy\,dx$

5. $\iint\limits_D \frac{x}{1+y^9}\,dA,\qquad D=\left\{\left(x,y\right)|\,0\le x\le y^4, 0\le y\le 1\right\}$

6. $\iint\limits_D \mathbf{e}^{y^4+2}\,dA,\qquad D$ is the region bounded by $x=y^3$, $x=0$, and $y=2$

7. Evaluate $\iint\limits_D 15xy\,dA$ where *D* is the triangle in the *xy*-plane with vertices (0,0), (0,4) and (1,3) in the order given,

(a) Integrate with respect to ***y*** first and then ***x*.**

(b) Integrate with respect to ***x*** first and then ***y***.

8. Find the volume behind $x=4y^2+2z^2$ and in front of the region in the *yz*-plane bounded by $y=z^2$ and $y=8\sqrt{z}$.

Note that we probably only looked at the volume under a function in the form $z=f\left(x,y\right)$ and above a region in the *xy*-plane. However, you can take that knowledge and modify it appropriately to arrive at a formula/method for working this problem.

Continued on Back $\Rightarrow$

For problems 9 and 10 evaluate the integral by reversing the order of integration.

9. $\int_0^{16}\int_{\sqrt{x}}^{4}\left(1+y^3\right)^3\,dy\,dx$

10. $\int_0^{2}\int_{-y}^{y} 4y\,dx\,dy$

11. Evaluate $\iint\limits_D xy^2\,dA$ where D is the shaded region shown below.