Iterated Integrals and Area in the Plane

1. Evaluate the integral
(Similar to p.990 #1-10)

$$\int_0^x (5x+3y)\,dx$$

2. Evaluate the integral
(Similar to p.990 #1-10)

$$\int_0^{\sqrt{x-1}} (7xy)\,dy$$

3. Evaluate the integral
(Similar to p.990 #1-10)

$$\int_0^{3x} (e^{x^2 y})\,dy$$

4. Evaluate the integral
(Similar to p.990 #1-10)

$$\int_0^{3x} (ye^{-3xy})\,dy$$

5. Evaluate the iterated integral
(Similar to p.990 #11-30)

$$\int_0^2 \int_0^3 (4x-y)\,\mathrm{dy}\,\mathrm{dx}$$

6. Evaluate the iterated integral
(Similar to p.990 #11-30)

$$\int_0^{\pi/2}\int_0^{2}(y^2\sin x)\,dy\,dx$$

7. Evaluate the iterated integral
(Similar to p.990 #11-30)

$$\int_0^{3}\int_0^{\sqrt{x}}(ye^{3x})\,dy\,dx$$

8. Evaluate the iterated integral
(Similar to p.990 #11-30)

$$\int_0^{\pi/2}\int_0^{\sin\theta}(r^5\cos\theta)\,dr\,d\theta$$

9. Evaluate the improper iterated integral
(Similar to p.990 #31-34)

$$\int_1^{\infty}\int_0^{2/x}(5y^4)\,dy\,dx$$

10. Use an iterated integral to find the area of the region bounded by the graphs of the equations
(Similar to p.990 #39-46)

$$4x-3y=0,\quad x+y=7,\quad y=0$$

11. Use an iterated integral to find the area of the region bounded by the graphs of the equations
(Similar to p.990 #39-46)

$$y=9-x^2,\quad y=x+3$$

12. Sketch the region R of integration and switch the order of integration
(Similar to p.990 #47-54)

$$\int_0^3 \int_0^{1/2y} (f(x, y))\, dx\, dy$$

13. Sketch the region R of integration and switch the order of integration
(Similar to p.990 #47-54)

$$\int_{-2}^{2} \int_{x^2}^{4} (f(x, y))\, dy\, dx$$

14. Sketch the region R whose area is given by the iterated integral. Then switch the order of integration and show that both orders yield the same area.
(Similar to p.990 #55-63)

$$\int_0^6 \int_{x/3}^{2} dy\, dx$$

15. Sketch the region of integration. Then evaluate the iterated integral (Note that it is necessary to switch the order of integration)
(Similar to p.991 #67-72)

$$\int_0^4 \int_x^4 \left(x\sqrt[5]{2+y^3}\right) dy\, dx$$

16. Sketch the region of integration. Then evaluate the iterated integral (Note that it is necessary to switch the order of integration)
(Similar to p.991 #67-72)

$$\int_0^1 \int_y^1 \left(\cos x^2\right) dx\, dy$$