HW. # 14

Homework problems are taken from several textbooks. The problems are color coded to indicate level of difficulty. The color green indicates an elementary problem, which you should be able to solve effortlessly. Yellow means that the problem is somewhat harder. Red indicates that the problem is hard. You should attempt the hard problems especially.

Sketch the region B and identify it as x-simple, y-simple, both, or neither.

1. B ={(x, y); $0 \le y \le x$, $0 \le x \le 4$}

2. B ={(x, y); $-3 \le y \le x^3 - x$, $-1 \le x \le 1$}

3. B ={(x, y); $y^2 \le x \le \frac{3y^2}{4} + 1$}

4. B ={(x, y); $e^y \le x \le e$, $0 \le y \le 1$}

5. B is the bounded portion of the intersection of A = {(x, y); $-1 - x^2 \le y \le 1 + x^2$} and C = {(x, y); $-1 - \frac{y^2}{25} \le x \le 1 + \frac{y^2}{25}$}

Evaluate the iterated integral and sketch the region of integration.

6. $\int_{-2}^{0}\int_{2}^{4}(3x^2 + 2y^3)dydx$

7. $\int_{0}^{\pi}\int_{x}^{\pi} ySin(x)dydx$

8. $\int_{0}^{1}\int_{e^{-x}}^{e^x} \frac{\ln(y)}{y} dydx$

9. $\int_{-1/4}^{1}\int_{-y}^{1-y^2} (5x - y)dxdy$

10. $\int_{0}^{\pi/8}\int_{0}^{y} Sec^2(x + y)dxdy$

Find the double integral of the function over the indicated region.

11. $f(x,y)=(x-2y)^2$, B is the rectangle with sides parallel to the axes and opposite corners (-1, -1) and (5, 2).

12. $f(x,y)=\frac{x}{(y+1)^2}$, B is the region bounded by the parabola $y=x^2$ and the line y = 4x.

13. $f(x,y)=ye^x$, B is the region bounded by the parabola $x=y^2$ and the line x = 5y.

14. $f(x,y)=xCos(y)Sin(y)$, B is the region bounded by the lines x = 1, x = -1, the x-axis, and $y=\tan^{-1}(x)$

Evaluate the double integral over the indicated region.

15. $\iint_B e^x$, where B is the rectangle with vertices (0, 0), (ln 2, 0), (ln 2, 1), and (0, 1).

16. $\iint_B (Cos(x)-y)$, where B is bounded by $y=Sin(x)$, y = 0, x = 0, and $x=\pi$.

17. $\iint_B x$, where B is the region in the first quadrant bounded by y = 0, y = 2, x = 0, and $x=1+y^2$.

Find the volume of the indicated solid region.

18. The solid bounded above by the paraboloid $z=x^2/4+y^2/9+1$, below by the xy-plane, and lying above the square S = {(x, y); $0\le x\le 1$, $0\le y\le 1$}.

19. The solid bounded above by the triangle in the xy-plane with vertices (0, 0, 0), (2, 0, 0), and (1, 1, 0), and bounded below by the plane z = -8 + x + y/2.

20. The solid bounded by the surface $z=(1-x^2)(1-y^2)$ and the xy-plane.

21. The solid bounded by the paraboloid $z=x^2+y^2$ and the plane z = 1.

Use double integrals to find the area of each of the indicated regions.

22. The quadrilateral with vertices (0, 0), (4, 0), (3, 1), (0, 2).

23. A disc of radius 10.

24. The region bounded by the curves $y = x^3$ and $x = y^3$.

Reverse the order of integration.

25. $\int_0^2 \int_x^2 f(x, y)\,dydx$

26. $\int_0^1 \int_1^{e^y} f(x, y)\,dxdy$

27. $\int_{\pi/2}^{\pi} \int_0^{\sin x} f(x, y)\,dydx$

28. $\int_{-4}^{4} \int_{-\sqrt{16-y^2}}^{\sqrt{16-y^2}} f(x, y)\,dxdy$

29. $\int_{-1}^{0} \int_{-x}^{1} f(x, y)\,dydx + \int_0^1 \int_{\sqrt{x}}^{1} f(x, y)\,dydx$

30. $\int_{-1}^{1} \int_{y-3}^{y^2} f(x, y)\,dxdy$