Homework for Chapter 15

- 15.1, number 1: Compute $\int_1^2 \int_0^4 2xy\, dy\, dx$.
- 15.1, number 17: Compute $\int\int_R (6y^2 - 2x)$,where R is the region described by $0 \le x \le 1$ and $0 \le y \le 2$. .
- 15.1, number 25: Integrate $f(x, y) = \frac{1}{xy}$ over the square $1 \le x \le 2$, $1 \le y \le 2$.
- 15.1, number 30: Find the volume of the region bounded above by the elliptical paraboloid $z = 16 - x^2 - y^2$ and bounded below by the square $0 \le x \le 2$ and $0 \le y \le 2$.
- 15.2, number 1: Sketch the region of integration in the xy-plane which is associated to the integral

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

- 15.2, number 9: Write the double integral over the region R shown on the picture page (after the problems from section 15.4). Do the problem twice. Once fill up the region using vertical lines and once, fill up the region using horizontal lines.
- 15.2, number 23: Compute $\int_0^{\sqrt{\pi}} \int_0^{x^2} x \sin y\, dy\, dx$.
- 15.2, number 33: Integrate $f(x, y) = x/y$ over the region in the first quadrant bounded by the lines $y = x$, $y = 2x$, $x = 1$, and $x = 2$.
- 15.2, number 35: Integrate $f(u, v) = v - \sqrt{u}$ over the triangular region in the first quadrant of the uv-plane cut out by $u + v = 1$.
- 15.2, number 37: Compute $\int_{-2}^0 \int_v^{-v} 2\, dp\, dv$ and draw thw region in the pv-plane over which you have integrated.
- 15.2, number 41: Sketch the region of integration for

$$\int_0^1 \int_2^{4-2x} dy\, dx.$$

  Set up the integral over the same region, with the order of integration reversed.

- 15.2, number 45: Sketch the region of integration for

$$\int_0^1 \int_1^{e^x} dy\, dx.$$

  Set up the integral over the same region, with the order of integration reversed.

- 15.2, number 49: Sketch the region of integration for

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

Set up the integral over the same region, with the order of integration reversed.

- 15.2, number 53: Sketch the region of integration for

$$\int_0^3 \int_1^{e^y} (x+y)\,dx\,dy.$$

Set up the integral over the same region, with the order of integration reversed.

- 15.2, number 60: Sketch the region of integration for

$$\int_0^3 \int_{\sqrt{x/3}}^1 e^{y^3}\,dy\,dx.$$

Set up the integral over the same region, with the order of integration reversed. Evaluate the new integral.

- 15.2, number 65: Find the volume of the region bounded above by the paraboloid $z = x^2 + y^2$ and below by the triangle enclosed by the lines $y = x$, $x - 0$, and $x + y = 2$ in the xy-plane.

- 15.2, number 69: Find the volume of the solid in the first octant bounded by the coordinate planes, the plane $x = 3$, and the parabolic cylinder $z = 4 - y^2$.

- 15.3, number 3: Find the area of the region bounded by $x = -y^2$ and $y = x + 2$.

- 15.3, number 10: Find the area of the region bounded by $y = 1 - x$, $y = 2$, and $y = e^x$.

- 15.3, number 13: Compute $\int_0^6 \int_{y^2/3}^{2y} dx\,dy$. This integral gives the area of a region. Draw the region.

- 15.3, number 17: Compute

$$\int_{-1}^0 \int_{-2x}^{1-x} dy\,dx + \int_0^2 \int_{-x/2}^{1-x} dy\,dx,$$

This sum of integrals gives the area of a region. Draw the region.

- 15.4, number 5: The region is given on the picture page after the problems from section 15.4. Describe the region in polar coordinates.
- 15.4, number 9: Change the integral into polar coordinates, then integrate:
$$\int_{-1}^{1}\int_{0}^{\sqrt{1-x^2}} dy\,dx.$$
- 15.4, number 21: Change the integral into polar coordinates, then integrate:
$$\int_{0}^{1}\int_{x}^{\sqrt{2-x^2}} (x+2y)\,dy\,dx$$
- 15.4, number 23: Convert the integral into an integral involving dx and dy. **Do Not compute any integral.**
$$\int_{0}^{\pi/2}\int_{0}^{1} r^3 \sin\theta\cos\theta\,d\theta$$
- 15.4, number 25: Convert the integral into an integral involving dx and dy. **Do Not compute any integral.**
$$\int_{0}^{\pi/4}\int_{0}^{2\sec\theta} r^5 \sin^2\theta\,dr\,d\theta.$$

Picture Page

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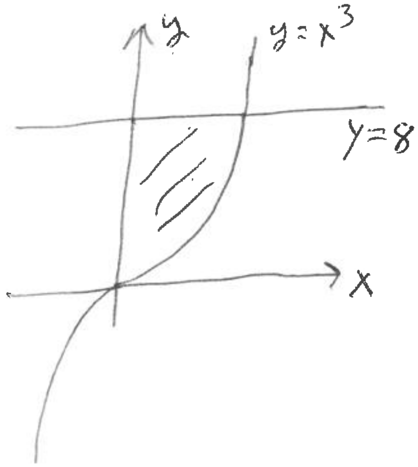

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