

Math 3C (21945) HW #6

Due at the beginning of lecture on Thursday, March 26th.

In order to receive a **✓**, you must attempt all problems and write out all steps leading to your answers neatly and legibly. You cannot simply write the correct answer to demonstrate your mathematical understanding.

You must include your name, the course title and section number on the first page. All homework sets must be stapled. No late homework will be accepted without my express permission. You may receive a **✗** if these guidelines are not followed.

Good luck!

Evaluate the integral.

$$1) \int_2^{10} \int_{-6}^9 6x \, dy \, dx$$

1) _____

$$2) \int_2^9 \int_{-5}^6 2y \, dx \, dy$$

2) _____

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

3) _____

$$4) \int_{-5}^7 \int_1^9 xy^2 \, dx \, dy$$

4) _____

$$5) \int_0^{4\pi} \int_0^{19\pi} (\sin x + \cos y) \, dx \, dy$$

5) _____

$$6) \int \int_R \frac{1}{xy} \, dA, \quad R = \{(x, y): 9 \leq x \leq 10, 9 \leq y \leq 10\}$$

6) _____

$$7) \int \int_R 9x \sin xy \, dA, \quad R = \{(x, y): 0 \leq x \leq \pi, 0 \leq y \leq 1\}$$

7) _____

$$8) \int \int_R \frac{1}{(x+1)(y+1)} \, dA, \quad R = \{(x, y): 0 \leq x \leq 1, 0 \leq y \leq 6\}$$

8) _____

Find the average value of the function f over the given region.

$$9) f(x, y) = 3x + 6y \text{ over the triangle with vertices } (0, 0), (6, 0), \text{ and } (0, 7).$$

9) _____

10) $f(x, y) = \frac{1}{xy}$ over the region bounded by $y = \frac{1}{x}$, $y = \frac{2}{x}$, $x = 3$, and $x = 9$. 10) _____

Find the volume under the surface $z = f(x,y)$ and above the rectangle with the given boundaries.

11) $z = x^2 + y^2$; $R = \{(x, y): 0 \leq x \leq 1, 0 \leq y \leq 1\}$ 11) _____

12) $z = 8x + 4y + 7$; $R = \{(x, y): 0 \leq x \leq 1, 1 \leq y \leq 3\}$ 12) _____

Evaluate the integral.

13) $\int_0^1 \int_{8y}^1 dx dy$ 13) _____

14) $\int_0^1 \int_0^{v^5} v du dv$ 14) _____

15) $\int_0^{\pi/10} \int_0^{\cos 5x} \sin 5x dy dx$ 15) _____

Integrate the function f over the given region.

16) $f(x, y) = xy$ over the triangular region with vertices $(0, 0)$, $(10, 0)$, and $(0, 6)$ 16) _____

17) $f(x, y) = \frac{x}{6} + \frac{y}{2}$ over the trapezoidal region bounded by the x -axis, y -axis, line $x = 6$, and line $y = -\frac{1}{3}x + 4$ 17) _____

18) $f(x, y) = \frac{1}{\ln x}$ over the region bounded by the x -axis, line $x = 5$, and curve $y = \ln x$ 18) _____

Find the volume of the indicated region.

19) the tetrahedron bounded by the coordinate planes and the plane $\frac{x}{2} + \frac{y}{6} + \frac{z}{10} = 1$ 19) _____

20) the region that lies under the plane $z = 4x + 6y$ and over the triangle with vertices at $(1, 1)$, $(2, 1)$, and $(1, 2)$ 20) _____

Reverse the order of integration and then evaluate the integral.

21) $\int_0^9 \int_x^9 \frac{\sin y}{y} dy dx$ 21) _____

$$22) \int_0^5 \int_{\sqrt{x/5}}^1 e^{y^3} dy dx$$

$$22) \underline{\hspace{2cm}}$$

$$23) \int_0^1 \int_{4y}^4 x^4 e^{x^2 y} dx dy$$

$$23) \underline{\hspace{2cm}}$$

$$24) \int_0^3 \int_{x/3}^1 2y^2 \cos xy dy dx$$

$$24) \underline{\hspace{2cm}}$$

Find the Jacobian for the given transformation.

$$25) x = 5u - 4v, y = 3u + 5v$$

$$25) \underline{\hspace{2cm}}$$

$$26) x = 6u^2, y = 2uv$$

$$26) \underline{\hspace{2cm}}$$

Answer Key

Testname: M3C_HW_6

1) 4320

2) 847

3) 60

4) 6240

5) 8π

6) $\left(\ln \frac{9}{10}\right)^2$

7) 9π

8) $\ln 2 \ln 7$

9) 20

10) $\ln 2$

11) $\frac{2}{3}$

12) 38

13) - 3

14) $\frac{1}{7}$

15) $\frac{1}{10}$

16) 150

17) 22

18) 4

19) 20

20) $\frac{20}{3}$

21) $1 - \cos 9$

22) $\frac{5}{3}(e - 1)$

23) $\frac{4e^{16} - 68}{3}$

24) $\frac{1}{3}(1 - \cos 3)$

25) 37

26) $24u^2$