

Math 3C (21945) HW #7 (Part I)

Due at the beginning of lecture on Thursday, April 9th.

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!

Sketch D and $g(D)$ from the description of D and change of variables $(x, y) = g(u, v)$.

1) $x = u^2 - v^2, y = 2uv$ where D is the rectangle $0 \leq u \leq 1, 0 \leq v \leq 1$ 1) _____

2) $x = u + v, y = 2u - v$ where D is the rectangle $0 \leq u \leq 1, -1 \leq v \leq 1$ 2) _____

3) $u = xy, v = \frac{y}{x}$ where D is the rectangle $1 \leq u \leq 4, \frac{1}{2} \leq v \leq 2$ 3) _____

4) $x = u \cos v, y = u \sin v$ where D is the rectangle $1 \leq u \leq 2, 0 \leq v \leq \frac{\pi}{2}$ 4) _____

Use the given transformation to evaluate the integral.

5) $u = x + y, v = -2x + y$; 5) _____

$$\int \int_R -2x \, dx \, dy,$$

R

where R is the parallelogram bounded by the lines $y = -x + 1, y = -x + 4, y = 2x + 2, y = 2x + 5$

6) $u = -9x + y, v = 8x + y$; 6) _____

$$\int \int_R (y - 9x)(8x + y) \, dx \, dy,$$

R

where R is the parallelogram bounded by the lines $y = 9x + 2, y = 9x + 7, y = -8x + 5, y = -8x + 9$

7) $u = y - x, v = y + x$; 7) _____

$$\int \int_R e^{(y-x)/(y+x)} \, dx \, dy,$$

where R is the trapezoid with vertices at (4, 0), (9, 0), (0, 4), (0, 9)

Evaluate the integral.

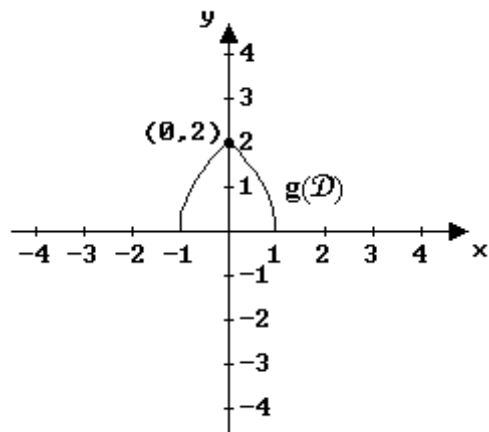
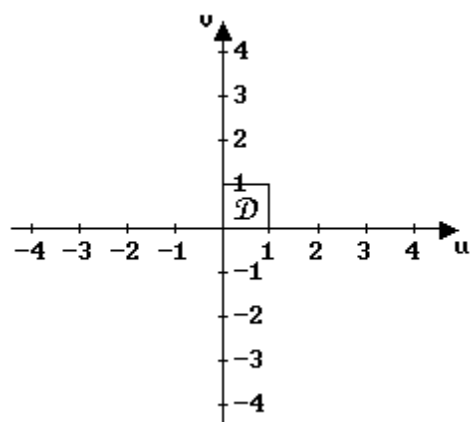
$$8) \int_{-4}^4 \int_{-\sqrt{16-y^2}}^0 \frac{\sqrt{x^2+y^2}}{1+\sqrt{x^2+y^2}} dx dy$$

8) _____

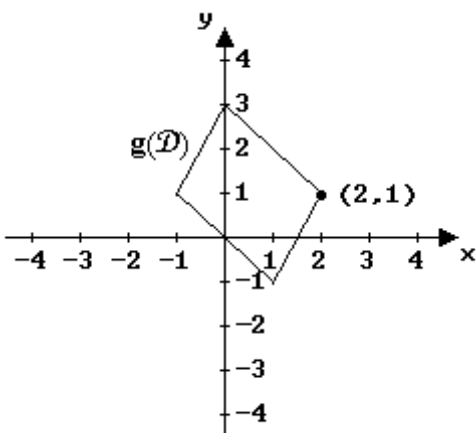
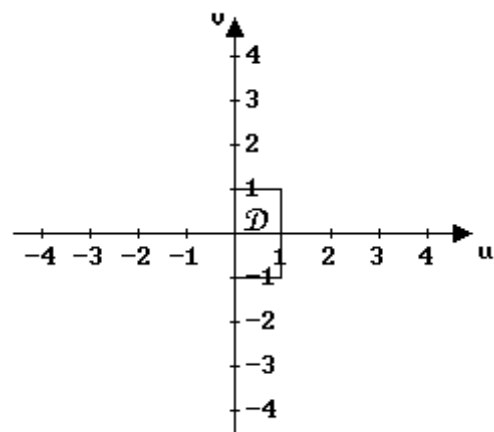
$$9) \int_0^{\ln 5} \int_0^{\sqrt{(\ln 5)^2 - y^2}} e^{\sqrt{x^2+y^2}} dx dy$$

9) _____

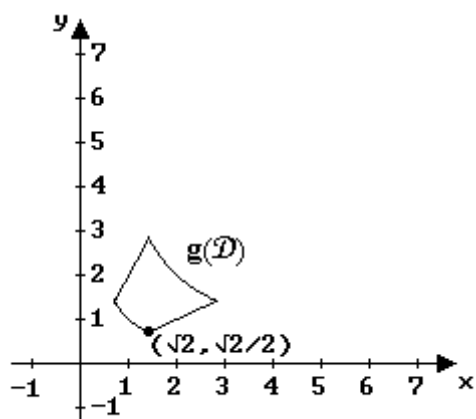
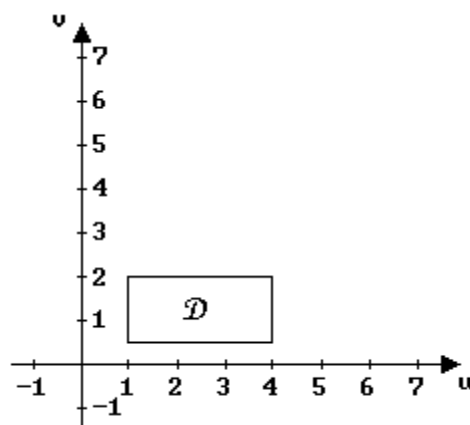
1)



2)



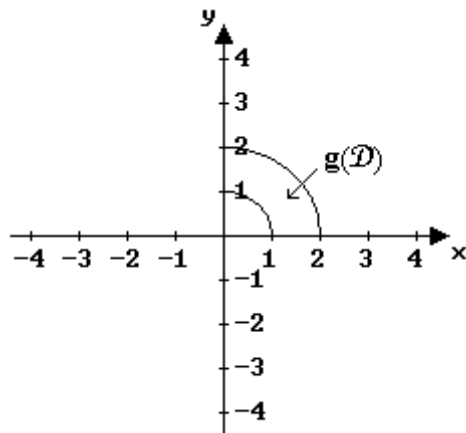
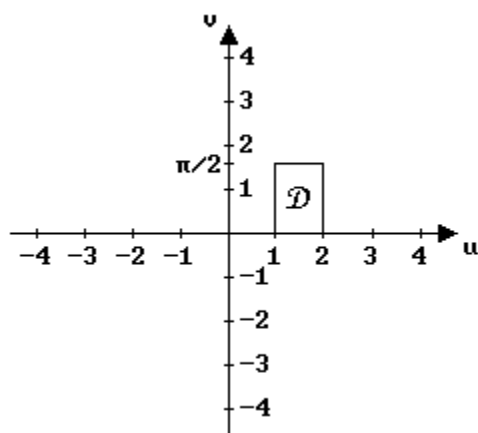
3)



Answer Key

Testname: M3C_HW_7

4)



5) 2

6) $\frac{630}{17}$

7) $\frac{65(e^2 - 1)}{4e}$

8) $\frac{\pi(8 + 2 \ln 5)}{2}$

9) $\frac{\pi(5 \ln 5 - 4)}{2}$