Quiz N°3 Math 302_122 (April 1, 2013)

KFUPM **Semester 122**

Dept. Math. &Stat. **A.Y:2012/2013**

Name: .....

ID: .....

Exercise 1

Compute the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$ for the following pairs of vector fields $\mathbf{F}$ and curves C.

(a) $\mathbf{F} = \langle y, x \rangle$ and C is the quarter-circle centered at the origin starting at $(2, 0)$ and proceeding counterclockwise to $(0, 2)$

(b) $\mathbf{F} = \langle y, x \rangle$ and C is the line segment starting at $(2, 0)$ and proceeding counterclockwise to $(0, 2)$

Exercise 2

(I)

which of the following vector fields are conservative:

(a) $\mathbf{F} = \langle y, x \rangle$

(b) $\mathbf{F} = \langle x, y \rangle$

(c) $\mathbf{F} = \langle x^2 y, 2x \rangle$

(d) $\mathbf{F} = \langle 2x \sin(y), x^2 \cos(y) \rangle$

(e) $\mathbf{F} = \langle 3x^2, x - 4y \rangle$

(f) $\mathbf{F} = \langle 2y^2 + e^{x-y}, 4xy - e^{x-y} + 2 \rangle$

(II)

Find a potential for the vector field in (f).

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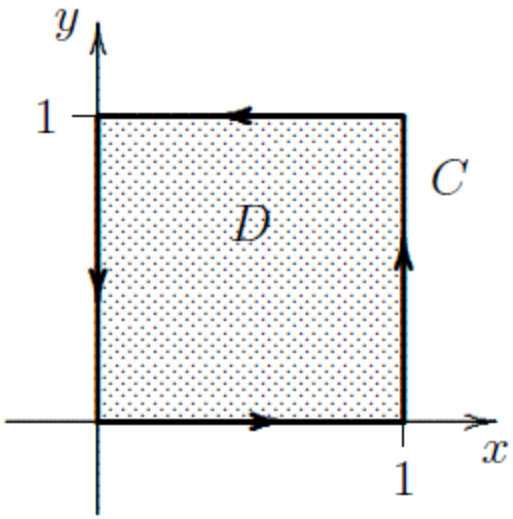
Exercise 3

For each of the following regions D, associated boundary curves C, and line integrals...

(a) Compute the given line integral directly by parameterizing the path C.

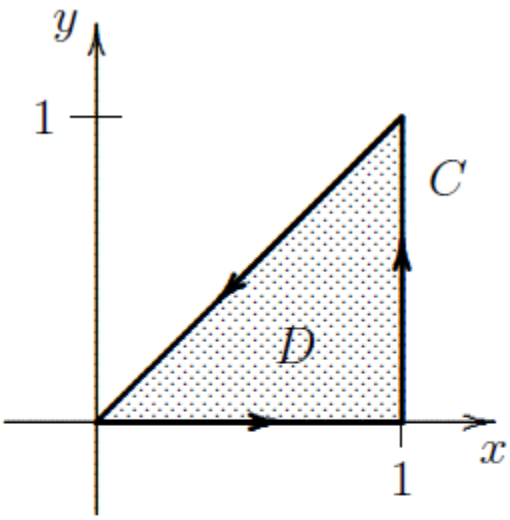
(b) Compute the given line integral by applying Green's theorem and computing a double integral.

(I)



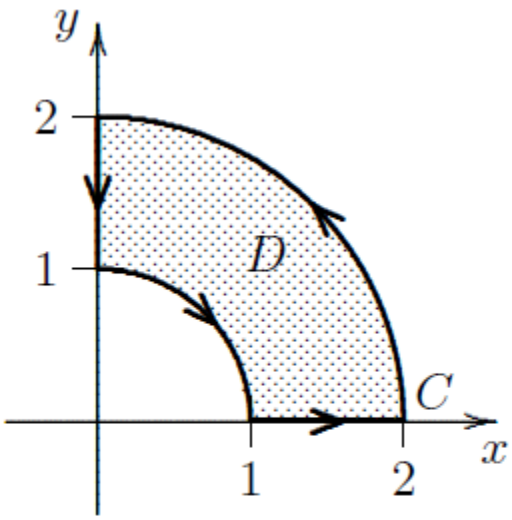
$$\int_C xy\,dx + (x^2 - y^2)\,dy$$

(II)



$$\int_C x^3\,dx - xy^2\,dy$$

(III)



$$\int_C xy^2\,dx - x^2y\,dy$$