Spring '05

MATH 331 (L20)

Assignment 5

Due date for ✠ problems: Tutorial Class

1. Textbook pg 227, 15: add (c): Along the line joining $(2,0)$ + $(-1,\sqrt{3})$

✠ 2. " pg. 251, 8(b) (Sketch region first)

✠ 3. Consider the double integral $\int_{y=0}^{3}\int_{x=1}^{\sqrt{4-y}}(x+y)\,dx\,dy$.
Interchange the order of integration and evaluate it.

4. Evaluate $\iint_A (x^2+y^2)\,dxdy$, where A is the region enclosed by: $x^2-y^2=1$, $x^2-y^2=9$, $xy=2$, $xy=4$ in the 1st quadrant. [Hint: Let $u=x^2-y^2$, $v=xy$, find $\frac{\partial(x,y)}{\partial(u,v)}$).

✠ 5. Find $\iint_A \sqrt{x^2+y^2}\,dxdy$ where A is the annular region bounded by $x^2+y^2=4$ and $x^2+y^2=9$.

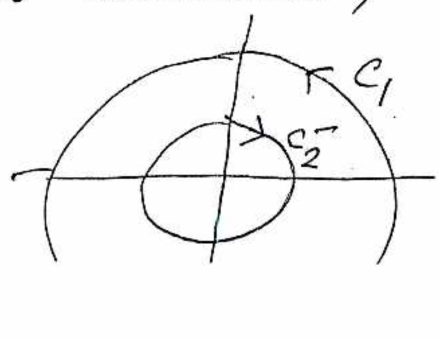
6 Use Green's Theorem to evaluate $\oint_C y^2dx+xdy$, where C is:

(i) the circle $x^2+y^2=9$

✠ (ii) the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$.

✠ 7. Evaluate $\oint_C (x^3-x^2y)\,dx+xy^2dy$,

where C is indicated, $C=\{C_1, C_2^-\}$, i.e.



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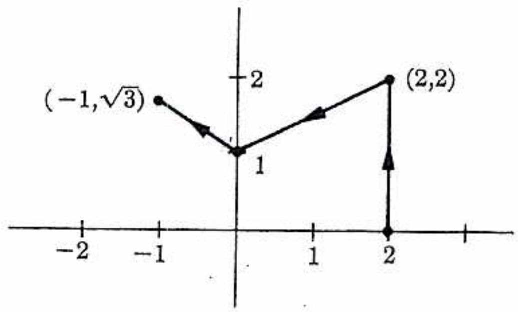
15. Find the integral of the vector field

$$G(x, y) = \left(\frac{-y}{x^2 + y^2}, \frac{x}{x^2 + y^2}\right):$$

(a) Along the line $x + y = 1$ from $(0, 1)$ to $(1, 0)$.
(b) From the point $(2, 0)$ to the point $(-1, \sqrt{3})$ along the path shown on the figure.



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8. Integrate the function f over the indicated region.
(a) $f(x, y) = 1/(x + y)$ over the region bounded by the lines $y = x$, $x = 1$, $x = 2$, $y = 0$.
(b) $f(x, y) = x^2 - y^2$ over the region defined by the inequalities

$$0 \leqq x \leqq 1 \qquad \text{and} \qquad x^2 - y^2 \geqq 0.$$

(c) $f(x, y) = x \sin xy$ over the rectangle $0 \leqq x \leqq \pi$ and $0 \leqq y \leqq 1$.
(d) $f(x, y) = x^2 - y^2$ over the triangle whose vertices are $(-1, 1)$, $(0, 0)$, $(1, 1)$.
(e) $f(x, y) = 1/(x + y + 1)$ over the square $0 \leqq x \leqq 1$, $0 \leqq y \leqq 1$.

9. Compute the integral of the function $f(x, y) = xy$ over the region sketched below.

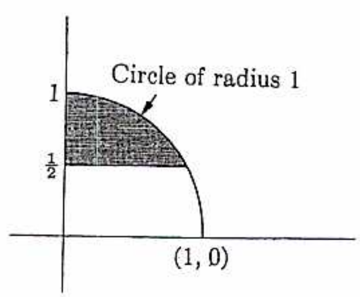

Figure 14