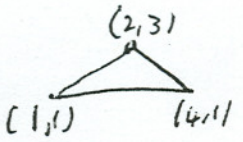
15

17. Find $\int_C \overbrace{(2x+3y)}^{M}dx+\overbrace{(4x+5y)}^{N}dy$ where C is the triangle with vertices $(1,1)$, $(4,1)$, and $(2,3)$. The curve is to be traveled in a counter clockwise manner starting and ending at $(1,1)$.

$= \iint_{\triangle} N_x - M_y \, dx\,dy = \iint_{\triangle} (4-3)\, dx\,dy =$ Area of the triangle $= \frac{1}{2}$ base $\cdot$ ht

GT



$= \frac{1}{2}(3)\cdot 2 = 3$

18. Find $\int_C y\,dx + x^2\,dy$ where C is the line segment from $(-1,2)$ to $(1,1)$.

$\begin{cases} x = -1+2t \\ y = 2-t \end{cases} \quad 0 \le t \le 1$

$\int_0^1 (2-t)2 + (-1+2t)^2(-1)\,dt$

$= \int_0^1 4 - 2t - (-1+2t)^2\,dt$

$= 4t - t^2 - \frac{(-1+2t)^3}{3\cdot 2}\Big]_0^1$

$= 4 - 1 - \frac{1}{6} + \left(-\frac{1}{6}\right)$