5/9/11

Review

Final

Mon. 5/16

1-3PM

Wednesday

Exam 5 / 15.1-15.5

HW due

Friday

- Extra credits due
  - ↳ only turn in fully attempted chapter reviews
- Review

15.3

(15) $\int y^2\,dx + 2xy\,dy$

$M = y^2 \qquad N = 2xy$

$\frac{dM}{dy} = 2y \qquad \frac{dN}{dx} = 2y$

So conservative vector field. Need potential function:

$\int M\,dx = \int y^2\,dx = xy^2 + g(y)$

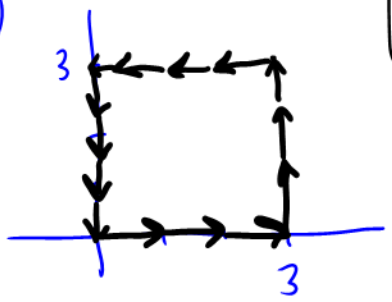
$\int N\,dy = \int 2xy\,dy = xy^2 + h(x)$

$g(y) = h(x) = K$

$f(x,y) = xy^2 + K$

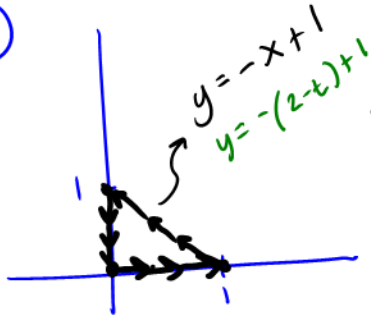
15.2

(3)



$$\vec{r}(t) = \begin{cases} t\hat{i}, & 0 \le t \le 3 \\ 3\hat{i} + (t-3)\hat{j}, & 3 \le t \le 6 \\ (9-t)\hat{i} + 3\hat{j}, & 6 \le t \le 9 \\ (12-t)\hat{j}, & 9 \le t \le 12 \end{cases}$$

(17)



$$\vec{r}(t) = \begin{cases} t\hat{i}, & 0 \le t \le 1 \\ (2-t)\hat{i} + (t-1)\hat{j}, & 1 \le t \le 2 \\ (3-t)\hat{j}, & 2 \le t \le 3 \end{cases}$$

15.1

(14) $\vec{F}(x,y) = (x^2+y^2)\hat{i} + \hat{j}$

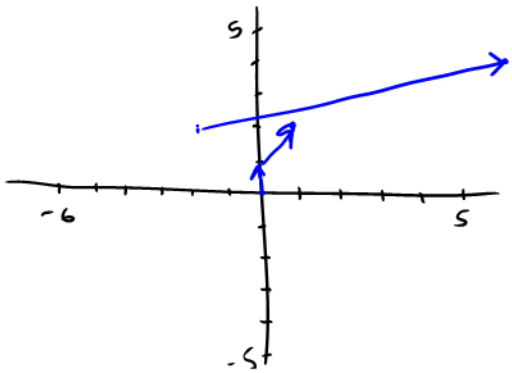
and $\|\vec{F}\| = \sqrt{(x^2+y^2)^2 + (1)^2}$

$(x^2+y^2)^2 + 1 = \|\vec{F}\|$

$\vec{F}(0,0) = \hat{j} \qquad \|\vec{F}(0,0)\| = 1$

$\vec{F}(0,1) = \hat{i} + \hat{j}$

$\vec{F}(-2,2) = 8\hat{i} + 2\hat{j}$



15.4

⑧ $\int_C (y-x)\,dx + (2x-y)\,dy$

$C: x = 2\cos\theta,\ y = \sin\theta$

↳ ellipse: $\frac{x^2}{2^2} + \frac{y^2}{1^2} = 1$

area of an ellipse is πab

$A = \pi(2)(1) = 2\pi$

$M = y - x \qquad N = 2x - y$

$\frac{\partial M}{\partial y} = 1$ and $\frac{\partial N}{\partial x} = 2$

$$\iint_R \left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right) dA = \iint_R 1\, dA$$

$= 1(2\pi)$

$= \boxed{2\pi}$