5. $\int_{1}^{2}\int_{-1}^{1}\left(\frac{x}{y}+3\right)\,dx\,dy$

$$\left.\frac{x^2}{2y}+3x+C\right|_{-1}^{1}$$

$$\left(\frac{1}{2y}+3+\cancel{C}\right)-\left(\frac{1}{2y}-3+\cancel{C}\right)$$

$$\int_1^2 6\,dy \qquad \left.6y+C\right|_1^2$$

$$12+C \quad - \quad 6+C$$

$$=6$$

7. $\vec{u} = \langle 1, -1, 2 \rangle, \vec{v} = \langle 2, 5, 3 \rangle$

$$2 + -5 + 6 = 3$$

$\vec{u} \cdot \vec{v} = 3$

17. $\vec{v} = \langle 4, 7 \rangle$

$4a + 7b = 0$

$4 + 7b = 0$

$\langle 1, \frac{-4}{7} \rangle$

$\langle -7, 4 \rangle$

$\vec{v} = \langle 2, 5, 3 \rangle$

$\|\vec{v}\| = \sqrt{2^2 + 5^2 + 3^2} = \sqrt{38} = 6.16$

unit vector facing $\vec{v}$ $\left\langle \frac{2}{\sqrt{38}}, \frac{5}{\sqrt{38}}, \frac{3}{\sqrt{38}} \right\rangle$

$\hat{v}$ $\hat{v}$

$\hat{i}$ $\hat{j}$ $\hat{k}$

positive x   positive y   positive z

$\langle 1, 0 \rangle$ $\langle 0, 1 \rangle$ $\langle 0, 0, 1 \rangle$

$\langle 1, 0, 0 \rangle$ $\langle 0, 1, 0 \rangle$

$\vec{i}$	$\vec{j}$	$\vec{k}$
2	−1	4
3	2	5

$$\langle 2, -1, 4 \rangle \times \langle 3, 2, 5 \rangle$$

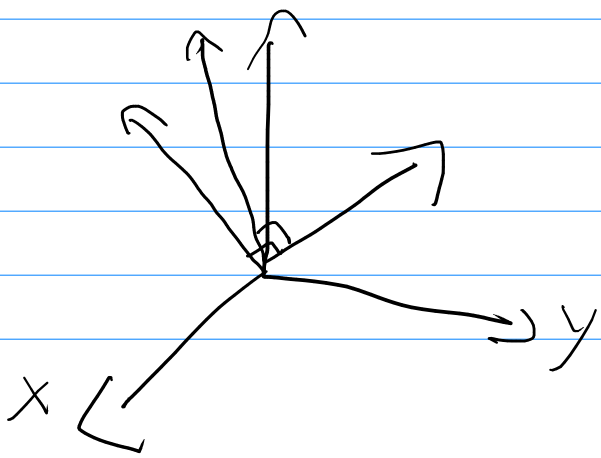
$-3\hat{k} + 8\hat{i} + 10\hat{j}$

$$\begin{array}{ccccc} \hat{i} & \hat{j} & \hat{k} & \hat{i} & \hat{j} \\ 2 & -1 & 4 & 2 & -1 \\ 3 & 2 & 5 & 3 & 2 \end{array}$$

$-5\hat{i} + 12\hat{j} + 4\hat{k}$

$$\langle -5, 12, 4 \rangle - \langle 8, 10, -3 \rangle$$

$$\langle -13, 2, 7 \rangle$$



$$\langle 1, 3, 6 \rangle \times \langle -1, 2, 1 \rangle$$

$-3\hat{k} + 12\hat{i} + 1\hat{j}$

$$\begin{array}{ccccc} \hat{i} & \hat{j} & \hat{k} & \hat{i} & \hat{j} \\ 1 & 3 & 6 & 1 & 3 \\ -1 & 2 & 1 & -1 & 2 \end{array}$$

$3\hat{i} - 6\hat{j} + 2\hat{k}$

$$\langle 3, -6, 2 \rangle - \langle 12, 1, -3 \rangle = \langle -9, -7, 5 \rangle$$

$$\underbrace{p \text{ and } (\text{not } p)} \Rightarrow \text{false}$$

p and (q or r)

truth table

p \ q	true	false
true	true	false
false	false	false

If x is even, then x^2 is even true

0	0
2	4
3	9
$\sqrt{2}$	2

$\Rightarrow$

$\Longleftrightarrow$

x is even iff $x+1$ is odd

Def. x is even
iff $\exists y$ such that $x = 2y$

$\forall$

x even

iff

$\exists y \in \mathbb{Z} : x = 2y$

integers

x is even
if and only if

there exists a y in the set of integers
such that x is 2 times y

$\mathbb{N}$ 0, 1, 2, ...

$\mathbb{Z}$ integers

$\mathbb{Q}$ fractions

$\mathbb{R}$ real #'s

$\mathbb{C}$ complex

$\mathbb{H}$ quaternions

$\mathbb{Z}^+$ 1, 2, 3, ...

i j k

$\{\ldots -2, -1, 0\}$