(101) (5)

$$W = \vec{F} \cdot \vec{s}$$

$$\vec{F} = \langle 2t, t^2 \rangle \text{ N}$$

$$\vec{s} = \langle 3, t/2 \rangle \text{ m}$$

$$\frac{dw}{dt} = \vec{F} \frac{d}{dt}\vec{s} + \vec{s} \frac{d}{dt}\vec{F}$$

$$W = \langle 2t, t^2 \rangle \cdot \langle 3, t/2 \rangle$$

$$W(t) = 6t + \frac{t^3}{2}$$

$$W(1) = 6.5 \text{ N-m} = 6.5 \text{ j}$$

$$\frac{dw}{dt} = \vec{F}\,\frac{d}{dt}(\vec{s}) + \vec{s}\,\frac{d}{dt}(\vec{F})$$

$$\frac{dw}{dt} = \langle 2t, t^2 \rangle \cdot \langle 0, 1/2 \rangle + \langle 3, t/2 \rangle \cdot \langle 2, 2t \rangle$$

$$= \left(0 + t^2/2\right) + \left(6 + t^2\right)$$

$$= \frac{3t^2}{2} + 6$$

$$\frac{dw}{dt}(1) = 7.5\ \frac{m \cdot m}{s} = 7.5\ \frac{j}{s} = 7.5\ W$$

(6) $W = \int \vec{F} \cdot d\vec{s}$ lb $\vec{F} = 6x\hat{i} - 2y\hat{j}$

ft $d\vec{s} = dx\hat{i} + dy\hat{j}$

$\vec{F} \cdot d\vec{s} = \langle 6x, -2y \rangle \cdot \langle dx, dy \rangle$

$\vec{F} \cdot d\vec{s} = 6x\,dx - 2y\,dy$

$\int \vec{F} \cdot d\vec{s} = \int 6x\,dx - \int 2y\,dy$

$\int \vec{F} \cdot d\vec{s} = 3x^2 - y^2 + C$

$\int_0^5 \vec{F} \cdot d\vec{s} = 3x^2 \Big]_0^5 = 75$ ft-lb

$\int_0^5 \vec{F} \cdot d\vec{s} = -y^2 \Big]_0^5 = -25$ ft-lb

(102) ①

$\vec{u} = \langle 1, -2, 5 \rangle$

$\vec{v} = \langle -3, 1, -1 \rangle$

$\vec{u} + \vec{v} = \langle -2, -1, 4 \rangle$

$2(\vec{u} + \vec{v}) = \langle -4, -2, 8 \rangle$

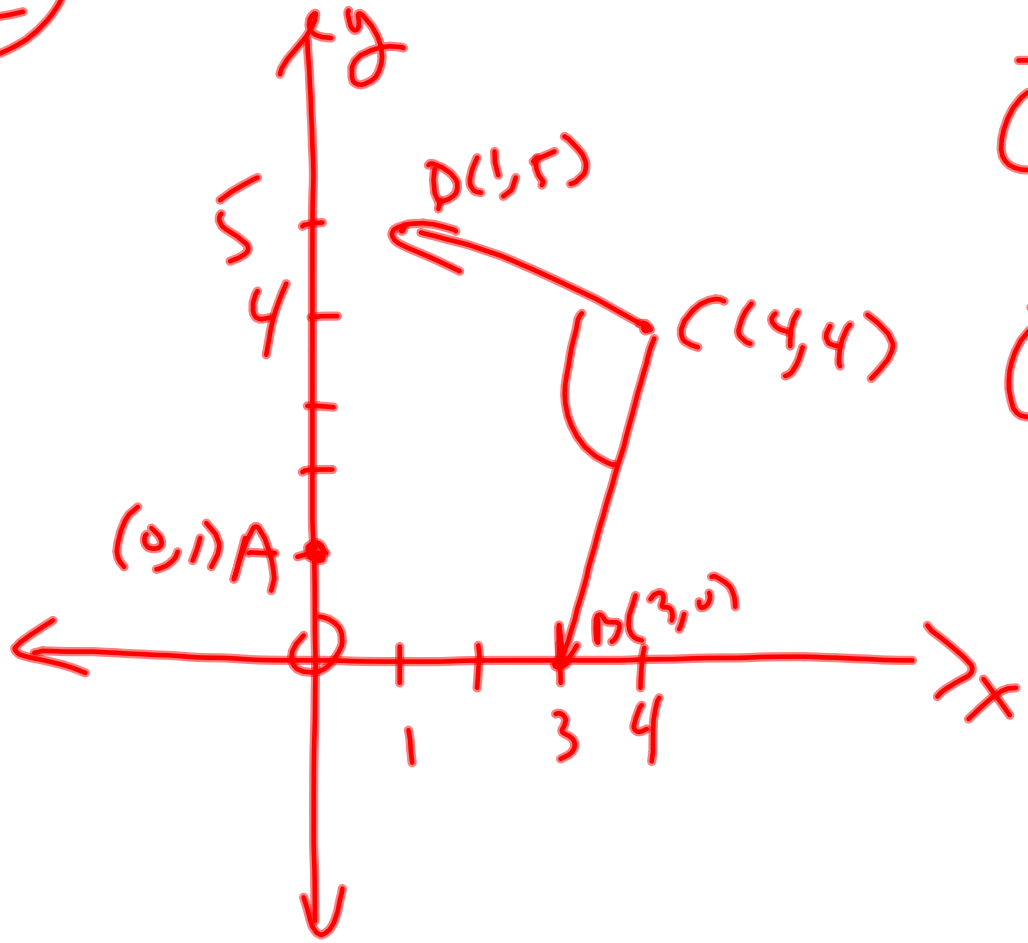
$2\vec{u} = \langle 2, -4, 10 \rangle$

$2\vec{v} = \langle -6, 2, -2 \rangle$

$2\vec{u} + 2\vec{v} = \langle -4, -2, 8 \rangle$

DISTRIBUTION OF SCALAR MULTIPLICATION OVER VECTOR ADDITION.

(2)



$\vec{D} = \langle -3, 1 \rangle$

$\vec{B} = \langle -1, -4 \rangle$

$$\vec{CD} \times \vec{CB} = \langle -3, 1 \rangle \times \langle -1, -4 \rangle$$

$$= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -3 & 1 & 0 \\ -1 & -4 & 0 \end{vmatrix}$$

$\langle 0, 0, 13 \rangle$

$$= (0-0)\hat{i} - (0-0)\hat{j} + (12+1)\hat{k} = 13\hat{k}$$