

1. A Region Lies In X-y plane, which has four boundary
 $2X+3Y=0$, $3X+Y=0$, $X-2Y=1$, $X-2Y=2$.

Find. $\iint_R \sin\left(\frac{3X+Y}{X-2Y}\right) dXdy$

2. For any vector field (called \vec{A} and \vec{B})

Prove that.

a. $\vec{\nabla} \cdot (\vec{A} \times \vec{B}) = \vec{B} \cdot (\vec{\nabla} \times \vec{A}) - \vec{A} \cdot (\vec{\nabla} \times \vec{B})$

b. $\vec{\nabla} (\vec{A} \cdot \vec{B}) = (\vec{B} \cdot \vec{\nabla}) \vec{A} + (\vec{A} \cdot \vec{\nabla}) \vec{B} + \vec{B} \times (\vec{\nabla} \times \vec{A}) + \vec{A} \times (\vec{\nabla} \times \vec{B})$

c. $\vec{\nabla} \times (\vec{A} \times \vec{B}) = (\vec{B} \cdot \vec{\nabla}) \vec{A} - (\vec{A} \cdot \vec{\nabla}) \vec{B} + (\vec{\nabla} \cdot \vec{B}) \vec{A} - (\vec{\nabla} \cdot \vec{A}) \vec{B}$

d. $\vec{\nabla} \times \vec{\nabla} \times \vec{A} = \vec{\nabla} (\vec{\nabla} \cdot \vec{A}) - \vec{\nabla}^2 \vec{A}$