

$$(25) \iint_R \cos\left(\frac{y-x}{y+x}\right) dA$$

$$(1,0) \quad (2,0) \quad (0,2) \quad (0,1)$$

$$y=1-x \quad y=2-x$$

$$x+y=1 \quad x+y=2$$

$$v=1 \quad v=2$$

$$v \in [1,2]$$

$$v=x+y$$

$$u=y-x$$

$$J(x,y) = \begin{vmatrix} \frac{\partial u}{\partial x} & \frac{\partial u}{\partial y} \\ \frac{\partial v}{\partial x} & \frac{\partial v}{\partial y} \end{vmatrix} = \begin{vmatrix} -1 & 1 \\ 1 & 1 \end{vmatrix} = -2 \quad J(u,v) = \frac{1}{J(x,y)} = -\frac{1}{2}$$

$$(x,y) \rightarrow (u,v)$$

$$(1,0) \quad (1,1) \quad u=-v$$

$$(2,0) \quad (0,2) \quad u=-v$$

$$(0,1) \quad (1,1) \quad v=v$$

$$(0,2) \quad (2,2) \quad v=v$$

$$\frac{1}{2} \int_1^2 \int_{-v}^v \cos\left(\frac{u}{v}\right) du dv$$

$$w = \frac{u}{v} \quad dw = \frac{1}{v} du$$

$$v=-w \quad w=-1$$

$$v=v \quad w=1$$

$$\frac{1}{2} \int_1^2 v \int_{-1}^1 \cos w dw dv$$

$$= \frac{1}{2} \left(2 - \frac{1}{2}\right) \int_{-1}^1 \cos w dw = \frac{1}{2} \left(\frac{3}{2}\right) (2 \sin(1) + \sin(-1))$$

$$= \boxed{\frac{3}{2} \sin(1)}$$