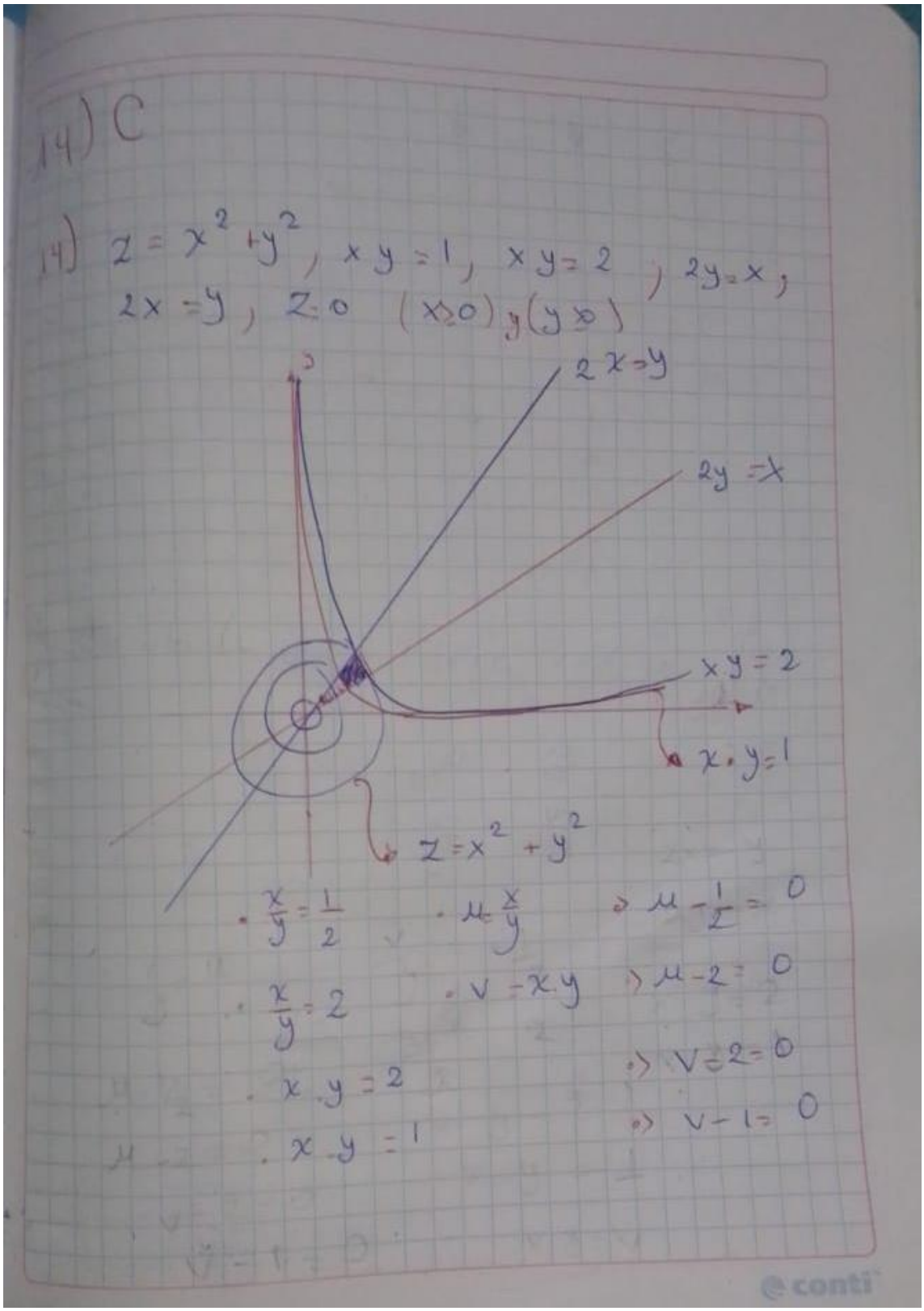
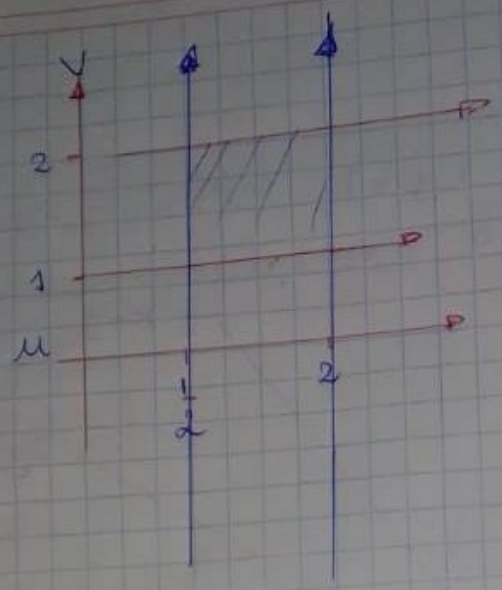
14.


14) C
14) $z = x^2 + y^2$, $xy = 1$, $xy = 2$, $2y = x$, $2x = y$, $z = 0$ $(x > 0)$ $(y > 0)$
$2x = y$
$2y = x$
$xy = 2$
$x \cdot y = 1$
$z = x^2 + y^2$
$\frac{x}{y} = \frac{1}{2}$
$\frac{x}{y} = 2$
$x \cdot y = 2$
$x \cdot y = 1$
$u = \frac{x}{y}$
$v = xy$
$u - \frac{1}{2} = 0$
$u - 2 = 0$
$v - 2 = 0$
$v - 1 = 0$



$$\int_1^2 \int_{1/2}^{2} f(x(u,v), y(u,v)) \cdot J(u,v) \, du \, dv$$

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

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

$$\int_1^2 \int_1^2 x^2 + y^2 \quad \frac{2x}{y} \cdot du\, dv$$

$$\int_1^2 \left[\int_1^2 \left[(x^2 + y^2) 2 \cdot u \; du \right] \right] dv$$

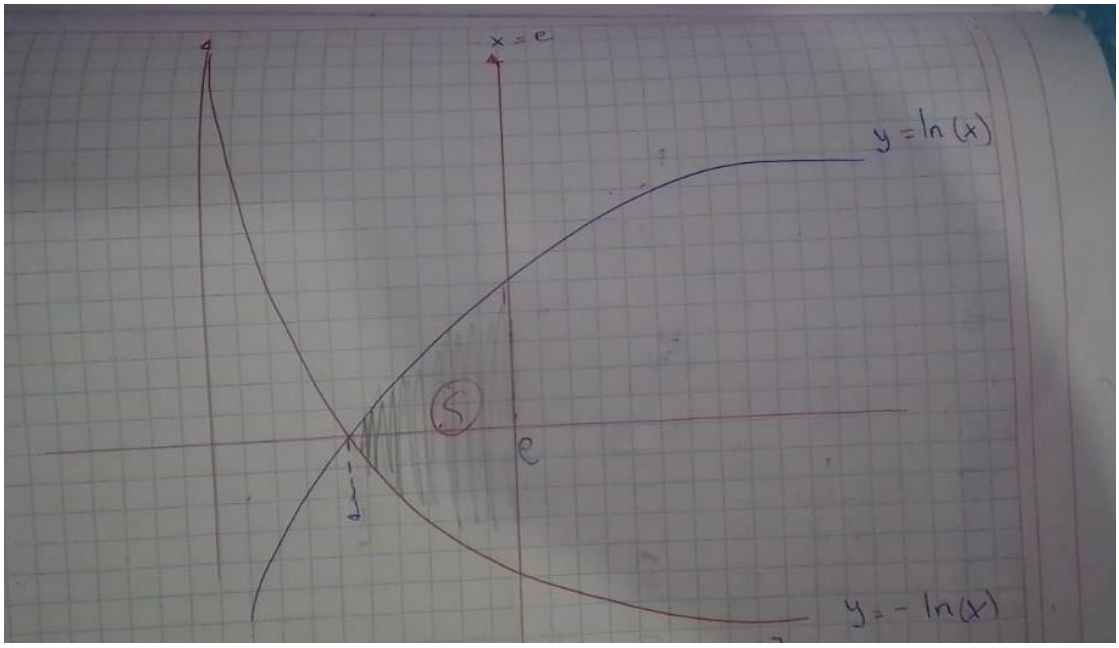
$$\int_1^2 \left| x^2 u^2 + y^2 u^2 \right|_{1/2}^2 dv$$

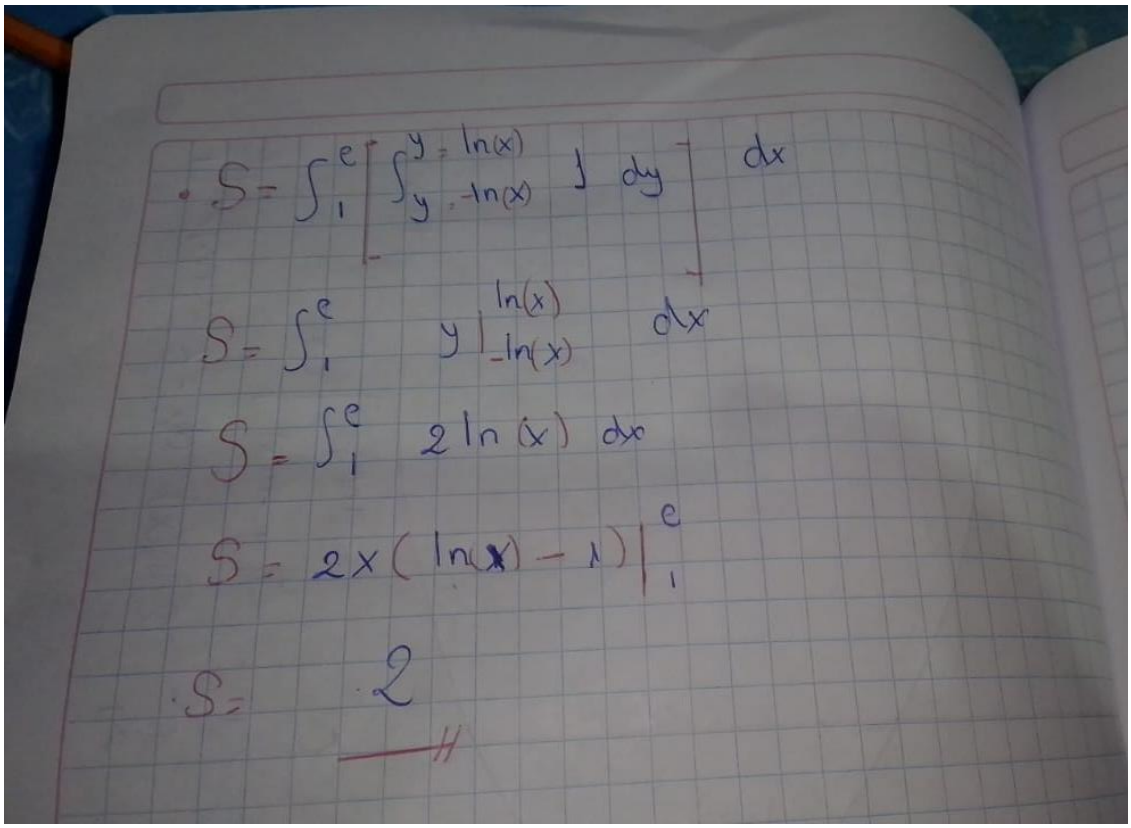
$$\int_1^2 \frac{15x^2}{4} + \frac{15y^2}{4} \; dv$$

$$\frac{15x^2 + 15y^2}{4} \cdot 1$$

$$\frac{15\left(x^2 + y^2\right)}{4} \; //$$

15.


x = e
y = ln(x)
S
e
1
y = - ln(x)


$S = \int_1^e \left[\int_{y=-\ln(x)}^{y=\ln(x)} 1 \, dy \right] dx$
$S = \int_1^e y \Big|_{-\ln(x)}^{\ln(x)} dx$
$S = \int_1^e 2\ln(x)\, dx$
$S = 2x(\ln(x) - 1)\Big|_1^e$
$S = 2$