

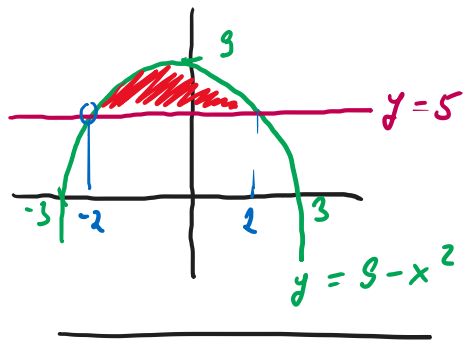
$$\textcircled{1} \quad A: y = 9 - x^2$$

$$y = 5$$

$$9 - x^2 = 5$$

$$4 - x^2 = 0$$

$$(x+2)(x-2) = 0$$



$$-2 \leq x \leq 2$$

$$5 \leq y \leq 9 - x^2$$

$$\textcircled{2} \quad \int_1^e \frac{\ln^2 x - 4}{x(\ln x + 2)} dx = \left. \begin{array}{l} \ln x = t \\ \frac{1}{x} dx = dt \\ x \rightarrow 1 \quad t \rightarrow 0 \\ x \rightarrow e \quad t \rightarrow 1 \end{array} \right| = \int_0^1 \frac{t^2 - 4}{t+2} dt = \int_0^1 \frac{(t+2)(t-2)}{t+2} dt =$$

$$\int_0^1 (t-2) dt = \left[\frac{t^2}{2} - 2t \right]_0^1 = \left(\frac{1}{2} - 2 \right) - (0) = \underline{\underline{-\frac{3}{2}}}$$

$$\textcircled{3} \quad f(x, y) = \ln xy + \sin(3x^2y + y^2)$$

$$f'_x = \frac{1}{x} + 6xy \cdot \cos(3x^2y + y^2)$$

$$f'_y = \frac{1}{y} + (3x^2 + 2y) \cos(3x^2y + y^2)$$

$$f''_{xx} = -\frac{1}{x^2} + 6y \cos(3x^2y + y^2) - (6xy)^2 \sin(3x^2y + y^2)$$

$$f''_{xy} = 6x \cos(3x^2y + y^2) - 6xy(3x^2 + 2y) \sin(3x^2y + y^2)$$

$$f''_{yx} = 6x \cos(3x^2y + y^2) - 6xy(3x^2 + 2y) \sin(3x^2y + y^2)$$

$$f''_{yy} = -\frac{1}{y^2} + 2 \cos(3x^2y + y^2) - (3x^2 + 2y)^2 \sin(3x^2y + y^2)$$