

9.

$$12.121212000 = 12 + \frac{12}{100} + \frac{12}{(100)^2} + \frac{12}{(100)^3} + \dots$$

$$= 12 \left(1 + \frac{1}{100} + \frac{1}{(100)^2} + \dots \right)$$

$$= 12 \sum_{n=0}^{\infty} \left(\frac{1}{100} \right)^n = 12 \frac{1}{1 - \frac{1}{100}} = \frac{12}{99/100}$$

$$= \frac{1200}{99}$$

d

4

10.

$$w = f(x, y) = 3xy^2 + xy$$

$$x^2y + xy^2 - 3xy$$

$$\nabla f = (3y^2 + y, 6xy + x)$$

$$\nabla f = (2xy + y^2 - 3y,$$

$$x^2 + 2xy - 3x)$$

$$Hf = \begin{pmatrix} 0 & 6y+1 \\ 6y+1 & 2x+2y \end{pmatrix}$$

$$\nabla^2 f = \begin{pmatrix} 2y & \\ & 2x+2y-1 \end{pmatrix}$$

$$x^2y + yx(y-1) \\ (x-1)(y-1)$$

$$x=0, y=1$$

$$2xy + (y-1)^2, x^2 + x(y-1)$$

$$H = \begin{pmatrix} 2y & 2x+2y-1 \\ 2x+2y-1 & (x-1)(y-1) \end{pmatrix}$$