

Assignment

Find the values of k for which roots of the equation $X^2-8kx+2k=0$ are equal.

Solution

To solve this problem, you can use the theorem of Vieta.

If X_1 and X_2 - the roots of a quadratic equation $ax^2+bx+c=0$, we can use these formulas:

$$\begin{cases} X_1 + X_2 = \frac{-b}{a} \\ X_1 \cdot X_2 = \frac{c}{a} \end{cases}$$

If $X_1=X_2$, we can create a new variable $X_1=X_2=X_k$. Put this new variable in the formulas of the theorem of Vieta:

$$\begin{cases} X_k + X_k = -8k \\ X_k \cdot X_k = 2k \end{cases}$$

We solve this system of equations:

$$X_k^2=2k$$

$$k= X_k^2/2$$

We substitute this into the first equation:

$$X_k + X_k = -8 \cdot X_k^2/2$$

$$2X_k = -4 \cdot X_k^2$$

$$X_k = -2 \cdot X_k^2$$

$$-2 = 1/ X_k$$

$$X_k = -\frac{1}{2}$$

Find the value of k using this formula: $k= X_k^2/2$

$$k = \left(-\frac{1}{2}\right)^2/2 = \frac{1}{4 \cdot 2} = \frac{1}{8} = 0,125$$

Answer: $k = \frac{1}{8} = 0,125$