



Problem of the Week Grade 11 and 12

How Does This Function Function? Solution

Problem

The function $f(x) = x^5 - 2x^4 + ax^3 - x^2 + bx - 2$ has a value of -7 when $x = -1$. Determine the value of the function when $x = 1$.

Solution

We know that the function has a value of -7 when $x = -1$. Therefore, $f(-1) = -7$.

$$\begin{aligned} f(-1) &= -7 \\ (-1)^5 - 2(-1)^4 + a(-1)^3 - (-1)^2 + b(-1) - 2 &= -7 \\ -1 - 2 - a - 1 - b - 2 &= -7 \\ -a - b &= -1 \\ \therefore a + b &= 1 \quad (1) \end{aligned}$$

At this point we seem to have used up the given information. Maybe we can learn more by looking at precisely what we are asked to determine.

In this problem, we want the value of the function when $x = 1$. In other words, we want $f(1)$.

$$\begin{aligned} f(1) &= 1^5 - 2(1)^4 + a(1)^3 - 1^2 + b(1) - 2 \\ &= 1 - 2 + a - 1 + b - 2 \\ &= a + b - 4 \end{aligned}$$

But from (1) above, $a + b = 1$ so $f(1) = (a + b) - 4 = (1) - 4 = -3$.

Therefore, the value of the function is -3 when $x = 1$.

We are not given enough information to find the precise values of a and b but enough information is given to solve the problem.

