



IIT Madras
ONLINE DEGREE

Mathematics for Data Science 1

Week 06 – Tutorial 02

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2. If a polynomial $3x^4 - 8x^3 + 16x^2 - 10$ is divided by another polynomial $x^2 - p$ the remainder comes out to be $-8x - c$ find the value of p and c , where p and c are the constant?

- A. $p = 1$ and $c = -19$
- B. $p = -1$ and $c = 19$
- C. $p = 1$ and $c = -19$
- D. $p = -4/5$ and c cannot be determined.

$$\begin{array}{r}
 3x^2 - 8x \\
 x^2 - p \overline{) 3x^4 - 8x^3 + 16x^2 - 10} \\
 \underline{3x^4} + 3px^2 \\
 -8x^3 + (16+3p)x^2 - 10 \\
 \underline{-8x^3} + 8px \\
 (16+3p)x^2 - 8px - 10
 \end{array}$$



constant?

- A. $p = 1$ and $c = -19$
- B. $p = -1$ and $c = 19$
- C. $p = 1$ and $c = -19$
- D. $p = -4/5$ and c cannot be determined.

$$\begin{array}{r}
 3x^2 - 8x + (16+3p) \\
 x^2 - p \overline{) 3x^4 - 8x^3 + 16x^2 - 10} \\
 \underline{3x^4} + 3px^2 \\
 -8x^3 + (16+3p)x^2 - 10 \\
 \underline{-8x^3} + 8px \\
 (16+3p)x^2 - 8px - 10 \\
 \underline{(16+3p)x^2} - (16p+3p^2) \\
 -8px - 10 + 16p + 3p^2
 \end{array}$$

$-8x - c$
 $= -8px - 10 + 16p + 3p^2$
 $p = 1$
 $c = -[-10 + 16p + 3p^2]$
 $= -[-10 + 16 + 3]$
 $= -[9]$
 $c = -9$

In question number two, there is this polynomial, $3x^4 - 8x^3 + 16x^2 - 10$ and is divided by another polynomial $x^2 - p$, then the remainder comes out to be $-8x - c$. They are saying find the value of p and c . So, let us do the division, then, we have $3x^4 - 8x^3 + 16x^2 - 10$ and here we have $x^2 - p$.

So, this gives us $3x^2$ to start with and so this will be $3x^4 - 3px^2$, so we should write it there, $-3px^2$. And this goes off, and we get $-8x^3$ + this becomes +. So, $16 + 3px^2 - 10$. So, now we have $-8x$ coming up here, which gives us $-8x^3 + 8x$, so $+8px$ and this goes off again.

So, we have $16 + 3px^2 - 8px - 10$. So, we again multiply by $16 + 3p$ here, and that gives us $16 + 3px^2$. And there is no x term, we get minus $16p - 3p^2$, then this of course cancelled again. So, we are left with $-8px - 10 + 16p - 3p^2$, because this is being subtracted.

So, they are saying this remainder is $-8x - c$. And that is equal to $-8px - 10 + 16p - 3p^2$. So, the x terms have to be the same here, which gives $p = 1$. And then c would be the negative of $-10 + 16p + 3p^2$, which is equal to the negative of $-10 + 16 + 3$. So, that is the negative of 9, and so we get -9 .

And that will indicate that none of the options are correct. So, this probably was supposed to be -9 . We observed that option A and option C are in fact the same thing. So, one of this was probably supposed to be -9 . Anyway, so our answer is that $p = 1$, and $c = 9$.

