Date _____ Week 12

Algebra

Subtopic: Polynomials

Lesson Topic: factorization of polynomials

INSTRUCTIONAL RESOURCES: A cardboard showing factor theorem

SPECIFIC OBJECTIVES:

Factorize polynomials of higher degree

Solve problems relating to polynomials

Find the roots of polynomial equations

Factor theorem:

A special case of the reminder theorem is when $f(x)$ leaves no reminder when divided by $x-a$. We therefore say that $x-a$ is a factor of $f(x)$. The modified theorem is called factor theorem and it states that

If $f(a)=0$, then $x-a$ is a factor of $f(x)$

STUDENTS ACTIVITIES: the students copy the notes

Solve:

Find the reminder when $f(x)=2x^3+3x^2-4x+1$ is divided by $2x-1$ what conclusion can you draw?

Solution:

Let R be the reminder when $f(x)$ is divided by $2x-1$, then $R=f\left(\frac{1}{2}\right)$

$f\left(\frac{1}{2}\right)=2\left(\frac{1}{2}\right)^3+3\left(\frac{1}{2}\right)^2-4\left(\frac{1}{2}\right)+1$

$=>\frac{1}{4}+\frac{3}{4}-2+1=0$

Hence: $2x-1$ is a factor of $f(x)$

Solve:

Factorize $f(x)=x^3-7x^2+14x-8$ completely

Solution:

$\pm$ In a complete factorized form

$f(x)=(x+p)(x+q)(x+r)-----------(i)$

The first term of the expression of equation (i) is x^3 while the last term of the expression is $\pm$pqr. Hence p, q, r must be factor of -8 therefore try

$x \pm 1$

$x \pm 2$

$x \pm 4$

$x \pm 8$

$f(-1) = 1 - 7 - 14 - 8 = -30 \neq 0$

$x + 1$ is not a factor of $f(x)$

$$
\begin{array}{r|l}
 & x^2 - 6x + 8 \\
\hline
x - 1 & x^3 - 7x^2 + 14x - 8 \\
 & x^3 - x^2 \\
\hline
 & -6x^2 + 14x \\
 & -6x^2 + 6x \\
\hline
 & 8x - 8 \\
 & 8x - 8 \\
\hline
 & 0
\end{array}
$$

Now, $x^2 - 6x + 8 = x^3 - 7x^2 + 14x - 8$

$= (x - 2)(x - 4)$

Hence: $f(x) = (x - 1)(x - 2)(x - 4)$

Solve:

Given that $f(x + 1) = x^2 + 3x - 1, find\ f(3)$

Solution:

Put $x + 1 = 3$

$x = 2$

$\therefore f(x) = (2)^2 + 3(2) - 1$

$= 4 + 6 - 1 = 9$

Solve:

Factorize $x^2 - 5x + 6 = f(x)$

Solution:

$f(x) = x^2 - 5x + 6$

$f(2) = (2)^2 - 5(2) + 6$

$f(x) = 4 - 10 + 6 = 0$

$f(2)$ is not $=>$ $(x - 2)$ is a factor

$$
\begin{array}{r|l}
 & x - 3 \\
\hline
x - 2 & x^2 - 5x + 6 \\
 & x^2 - 2x \\
\hline
 & -3x + 6 \\
 & -3x + 6 \\
\hline
 & 0
\end{array}
$$

$f(x) = (x - 2)(x - 3)$

ASSIGNMENT:

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