ALGEBRA 4

Day 50

Bell Work

4. Given $f = cd^3$, $f = 450$, and $d = 10$, what is c ?

F. 0.45
G. 4.5
H. 15
J. 45
K. 150

From Last Time

- page 322 #1-7, 9-19 (odd), 38-40, 44

Catch Up Day

- What do we need to talk about from previous classes?
- Quiz on Solving towards end of class…

Unit 5 Quiz 2

- You can use your notes (as always on a quiz)
- You'll want a calculator to help you find zeros.

5.6 The Fundamental Theorem of Algebra

Objective(s): To use the Fundamental Theorem of Algebra to solve polynomial equations with and without complex solutions.

The Fundamental Theorem of Algebra

The degree of a polynomial function tells us how many zeros we'll have in the problem

Fantasy Math Talk…

If f(x) is a polynomial of degree n where $n \geq 0$, then the equation $f(x) = 0$ has exactly n roots, including multiple and complex roots.

What are the roots for the following equation?

$$P(x) = x^5 - x^4 - 3x^3 + 3x^2 - 4x + 4 = 0$$

Note: There are 5 zeros (solutions) because the degree is 5.

Lets graph… cross our fingers that it touches 5 times

$$P(x) = x^5 - x^4 - 3x^3 + 3x^2 - 4x + 4 = 0$$

$\boldsymbol{x = 1}$ $\boldsymbol{x = 2}$ $\boldsymbol{x = -2}$ $\boldsymbol{x =}$ _____ $\boldsymbol{x =}$ _____

So how can we find the imaginary?

(We need to get to x^2 equation to use quadratic formula)

Divide!! We know there are 5 answers, we have 3… divide 3 times and it will leave us the last 2!

$$
\begin{array}{cccccccc}
 & x^5 & -x^4 & -3x^3 & +3x^2 & -4x & +4 & \\
1 & & 1 & 0 & -3 & 0 & -4 & \\
\hline
 & 1 & 0 & -3 & 0 & -4 & 0 & \rightarrow x^4 + 0x^3 - 3x^2 + 0x - 4
\end{array}
$$

$$
\begin{array}{cccccc}
 & 1 & 0 & -3 & 0 & -4 \\
2 & & 2 & 4 & 2 & 4 \\
\hline
 & 1 & 2 & 1 & 2 & 0 \quad \rightarrow x^3 + 2x^2 + 1x + 2
\end{array}
$$

$$
\begin{array}{cccccc}
 & 1 & 2 & 1 & 2 & \\
-2 & & -2 & 0 & -2 & \\
\hline
 & 1 & 0 & 1 & 0 & \rightarrow x^2 + 0x + 1 = 0
\end{array}
$$

$$P(x) = x^5 - x^4 - 3x^3 + 3x^2 - 4x + 4 = 0$$

Use quadratic formula to find the last two zeros…

$$\boldsymbol{x = 1} \qquad \boldsymbol{x = 2} \qquad \boldsymbol{x = -2} \qquad \boldsymbol{x = i} \qquad \boldsymbol{x = -i}$$

More Examples

- $x^5 - x^4 - 7x^3 + 7x^2 - 18x + 18 = 0$

- $x^4 + 2x^3 - 4x^2 - 7x - 2 = 0$