Rational Root Theorem

Procedure:

1. Write all the factors of the leading coefficient
2. Write all the factors of the constant
3. Place all the factors of the constant over all the factors of the leading coefficient, positive & negative
4. Use synthetic substitution by substituting those possible solutions in step 3 to find the zeros

Example: Find all possible solutions $3x^3 - 5x^2 + 6x - 16 = 0$

1. $\pm\{1, 3\}$
2. $\pm\{1, 2, 4, 8, 16\}$
3. $\pm\{\frac{1}{1}, \frac{2}{1}, \frac{4}{1}, \frac{8}{1}, \frac{16}{1}, \frac{1}{3}, \frac{2}{3}, \frac{4}{3}, \frac{8}{3}, \frac{16}{3}\}$

4.

$$\begin{array}{r|rrrr} 1 & 3 & -5 & 6 & -16 \\ & & 1 & -4 & 2 \\ \hline & 1 & -4 & 2 & -14 \end{array} \qquad \begin{array}{r|rrrr} 2 & 3 & -5 & 6 & -16 \\ & & 6 & 2 & 16 \\ \hline & 3 & 1 & 8 & 0 \end{array}$$

Therefore x = 2 is a solution and the depressed equation is $3x^2 + x + 8 = 0$ which can be solved by the Quadratic Formula.

Use the Rational Root Theorem to find all the possible solutions to the following equations.

	A	B
1.	$x^2 + 7x + 12 = 0$	$x^2 - 6x + -16 = 0$
2.	$x^2 + 5x + 6 = 0$	$x^2 - 25 = 0$
3.	$x^3 + 4x^2 + 8x + 5 = 0$	$3x^3 - 2x^2 - 8x - 3 = 0$

4. $2x^4 + 7x^3 + 4x^2 - 7x - 6 = 0$

$2x^3 - 13x^2 - 13x - 15 = 0$

5. $x^3 + 3x^2 - 9x + 4 = 0$

$2x^2 - 4x - 12 = 0$

Find the solution set using the Rational Root Theorem & Synthetic Substitution

6. $2x^3 - 5x - 3 = 0$

7. $2n^3 + 3n^2 - 11n - 6 = 0$