MAT 171 - CLASS NOTES - Section 3.3: Diving Polynomials; Remainder and Factor Theorems

1. Use long division to divide.

   $(6x^3 - 16x^2 + 17x - 6) \div (3x - 2)$

2. Use synthetic division to divide.

   (a) $(5x^3 + 18x^2 + 7x - 6) \div (x + 3)$

   (b) $(5x^3 + 3x - 6x^2 + 11) \div (x - 2)$

   (c) $\dfrac{x^5 - 2x^4 - 12x + 15}{x + 4}$

3. **Remainder Theorem** - If a polynomial $f(x)$ is divided by $x - k$, the remainder is $r = f(k)$.

4. Use synthetic division to find each function value of $g(x) = x^4 - 5x^3 + 5x^2 + 5x - 12$. Verify your answers using another method.

   (a) $g(2)$

   (b) $g(-3)$

5. **Factor Theorem** - A polynomial $f(x)$ has a factor $(x-k)$ if and only if $f(k)=0$.

6. Use synthetic division to divide $2x^3-15x^2+27x-10$ by $x-5$. Use the result to find the remaining zeros of f.

7. Sove the equation $48x^3-80x^2+41x-6=0$ given that $\frac{2}{3}$ is a root.