Mini Lecture 4.2

(1) Remainder Theorem

$f(x) = x^5 - x^4 + x^3 - 2x^2 + 3x - 6$, divided by $x+1$

$x+1=0$

$\underline{x=-1}$

$f(-1) = (-1)^5 - (-1)^4 + (-1)^3 - 2(-1)^2 + 3(-1) - 6$

$= -1 - 1 - 1 - 2 - 3 - 6$

$= \boxed{-14}$

(2) Rational Zero Theorem

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

$\frac{4}{5} = \frac{\pm 1, \pm 2, \pm 4}{\pm 1, \pm 5}$

$= \boxed{\pm 1, \pm \frac{1}{5}, \pm 2, \pm \frac{2}{5}, \pm 4, \pm \frac{4}{5}}$

4.2 mini Lecture

(3) $6x^3 - 11x^2 - x + 6$ $\quad \frac{p}{q} = \frac{\pm 1, \pm 6, \pm 2, \pm 3}{\pm 1, \pm 6, \pm 2, \pm 3}$

possible zeros: $\pm 1, \pm \frac{1}{6}, \pm \frac{1}{2}, \pm \frac{1}{3}, \pm 6, \pm 3, \pm 2, \pm \frac{2}{3}, \pm \frac{3}{2}$

-1 | $6 \quad -11 \quad -1 \quad 6$

$\quad\quad -6 \quad 17 \quad -16$

$6 \quad -17 \quad 16 \quad -10$

1 | $6 \quad -11 \quad -1 \quad 6$

$\quad\quad 6 \quad -5 \quad -6$

$6 \quad -5 \quad -6 \quad \boxed{0}$ ✓

$$\begin{array}{r} 6x^2 - 5x - 6 \\ x-1 \overline{)\, 6x^3 - 11x^2 - x + 6} \\ -6x^3 + 6x^2 \\ \hline -5x^2 - x \\ +5x^2 \mp 5x \\ \hline -6x + 6 \\ -6x + 6 \\ \hline \end{array}$$

$(x-1)(6x^2 - 5x - 6)$

$(x-1)(3x+2)(2x-3)$

Zeros $\{1, -2/3, 3/2\}$

4.2 mini Lecture

(4) $12x^3 + x^2 - \frac{9}{2}x + 1 = 0$

Show $[-1, 0]$ contains a zero

$x = -1 \longrightarrow y = -5.5$

$x = 0 \longrightarrow y = 1$

] change of signs so there is a zero

Zero is at $\boxed{(-.74, 0)}$