#5 $x^4 - x^3 + 3x^2 - 9x - 54 = 0$

$x = -2$, $x = 3$

$-2$ | $1$ $-1$ $3$ $-9$ $-54$

$\quad -2$ $6$ $-18$ $54$

$3$ | $1$ $-3$ $9$ $-27$ $0$

$\quad 3$ $0$ $27$

$1$ $0$ $9$ $0$

$x^3$ $x$ nat

$x^2 + 9 = 0$

$x^2 = -9$

$x = \pm\sqrt{-9}$

$x = \pm 3i$

#6 $x^4 - 6x^3 + 30x - 25 = 0$

$x = 1$, $x = 5$

$1$ | $1$ $-6$ $0$ $30$ $-25$

$\quad 1$ $-5$ $-5$ $25$

$5$ | $1$ $-5$ $-5$ $25$ $0$

$\quad 5$ $0$ $-25$

$1$ $0$ $-5$ $0$

$x^3$ $x^2$ $x$ nat

$x^2 - 5 = 0$

$x^2 = 5$

$x = \pm\sqrt{5}$

#7 $x^4 + 4x^3 + 6x^2 + 4x + 1 = 0$

$x = -1$, $x = -1$

$-1$ | $1$ $4$ $6$ $4$ $1$

$\quad -1$ $-3$ $-3$ $-1$

$-1$ | $1$ $3$ $3$ $1$ $0$

$\quad -1$ $-2$ $-1$

$1$ $2$ $1$ $0$

$x^3$ $x^2$ $x$ nat

$x^2 + 2x + 1 = 0$ (PSD)

$(x+1)(x+1) = 0$

$x + 1 = 0$ $x + 1 = 0$

$x = -1$ $x = -1$

#1 REVISITED

$-x^3 - 3x^2 - 18x + 40 = 0$

Q P

P: $\pm 1, \pm 2, \pm 4, \pm 5, \pm 8, \pm 10, \pm 20, \pm 40$

Q: $\pm 1$

$\frac{P}{Q} = \pm 1, \pm 2, \pm 4, \pm 5, \pm 8, \pm 10, \pm 20, \pm 40$

$1$ | $1$ $-3$ $-18$ $40$

$\quad 1$ $-2$ $-20$

$1$ $-2$ $-20$ $20$

$-1$ | $1$ $-3$ $-18$ $40$

$\quad -1$ $4$ $14$

$1$ $-4$ $-14$ $54$

$2$ | $1$ $-3$ $-18$ $40$ $x = 2$

$\quad 2$ $-2$ $-40$

$1$ $-1$ $-20$ $0$

$x^2$ $x$ nat

$x^2 - x - 20 = 0$

$(x-5)(x+4) = 0$

$x - 5 = 0$ $x + 4 = 0$

$x = 5$ $x = -4$