Two Skills Necessary for Factoring Polynomials

- $P(x) = 2x^4 - 3x^3 + 2x - 3$
- An integer factor $P(x)$ looks like $(x-r)$: $(x-1)(x+5)$
- r is a factor of the last term of the polynomial.

Example: -3 is the final term in $P(x)$. r must divide -3. r could be $-3, +3, -1, 1$ to find r.

Evaluate $P(x)$ at all potential values of r.

- $P(x) = 2x^4 - 3x^3 + 2x - 3$
- $P(3) = 2(-3)^4 - 3(-3)^3 + 2(-3) - 3 = 234$
- $P(3) = 2(3)^4 - 3(3)^3 + 2(3) - 3 = 84$
- $P(-1) = 2(-1)^4 - 3(-1)^3 + 2(-1) - 3 = 0$
- $P(1) = 2(1)^4 - 3(1)^3 + 2(1) - 3 = -2$

If $x = -1$, then $(x+1)$ is a factor of $P(x)$

$P(x) = 4x^4 - x^3 - 8x^2 - 40$

Potential r values: $(+,-)$ 1, 2, 4, 5, 8, 10, 20, 40

$P(1) = -45$

$P(-1) = -43$

$P(2) = -16$

$P(-2) = 0$ $(x+2)$ is a factor

$P(4) = 792$

$P(5) = 2135$

$P(8) = 15320$

$P(10) = 38160$

$P(20) = 628\ 760$

$P(40) = 10163160$

Hilroy