Hessa Almheiri

Q1: Find all possible rational roots

$f(x) = x^7 - x^2 + x + 4$

All coef. are integers so we can apply the method, if there is a rational root c $\quad c = \pm \frac{\text{factor of } a_0}{\text{factor of } a_n}$

$a_0 = 4 \qquad a_n = 1$

$1, 2, 4 \qquad\qquad 1$

all possibilities of c:

$c = \pm 1 \quad c = \pm 2 \quad c = \pm 4$

$f(1) \neq 0 \quad f(-1) \neq 0 \quad f(2) \neq 0 \quad f(-2) \neq 0 \quad f(4) \neq 0 \quad f(-4) \neq 0$

Hence we don't have a rational root

Q2: Convince me that f(x) doesn't have a rational root

$f(x) = x^{2018} + 9x^3 - 18x + 3$

- All coef. are integers.
- Find prime # p s.that $p \nmid 1$, $p \mid 9, -18, 3$ and $p^2 \nmid 3$

$p = 3$

$3 \nmid 1, \quad 3 \mid 9, \quad 3 \mid -18, \quad 3 \mid 3 \qquad 3^2 = 9 \nmid 3$

Hense f(x) has no rational roots.

Shahd Abdelmeguid

Q. $f(x) = x^3 - 6x^2 + 12x - 3$. Convince me that x has no rational roots.

$p = 3 \rightarrow p \mid$ every coefficient except a_3

$p^2 = 9 \rightarrow 9 \nmid 3$

Hence, $f(x)$ has no rational roots

Q. $f(x) = 2x^4 - 5x + 1$. Find all possible rational roots

* possible values of c :

$$c = \frac{\pm 1}{1}, \frac{\pm 1}{2}$$

try $F(1) = -2$

$F(-1) = 8$

$F(1/2) = -1.375$

$F(-1/2) = 3.625$

No rational roots