If $f(x) \in \mathbb{K}[x]$, $\mathbb{K}$ a field,
then in video 0 I claimed

$$f(a) = 0 \iff (x-a) \mid f(x)$$

i.e. $f(x) = q(x)(x-a)$.

Start with Exercise 2-(1)
to justify this.

(Note: one way when $\mathbb{K} = \mathbb{R}$ is to write down
the Taylor expansion of $f(x)$ at $x = a$).

$n=2$

$$
\begin{array}{r l}
 & c_2 x + (c_1 + a c_2) \\
x - a \,\big)\!\!\! & \overline{c_2 x^2 + c_1 x + c_0} \\
 & -(c_2 x^2 - a c_2 x) \\
 & (c_1 + a c_2) x + c_0 \\
 & -\big((c_1 + a c_2) x - (c_1 + a c_2) a\big) \\
\hline
 & c_0 + c_1 a + c_2 a^2
\end{array}
$$

remainder $= f(a)$.

2 - (2) Describe an algorithm to find the prime factorization of any polynomial in $\mathbb{F}_p[x]$.

Prime in $\mathbb{K}[x]$ = a monic polynomial $a(x)$ such that if

$b(x) \mid a(x)$ then

$\deg b(x) = \deg a(x)$ ← $b(x) =$
or $\deg b(x) = 0$. ← $b(x)$
if b
no

Any nonzero polynomial $f(x)$

has a unique prime factorization

$f(x) = c\, a_1(x)^{n_1} a_2(x)^{n_2} \cdots a_k(x)^{n_k}$ $\quad a_i(x)$

$c \in \mathbb{K}$ are prime, $n_i \geq 1$

2.(2) asks to describe an algorithm for finding prime factorization,

Exercise 1: Pascal's triangle & binomial coefficients

Pascal's triangle

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

$\binom{n}{k}$ means the number of ways to choose k flavors of ice cream from a menu with n flavors