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lec B - Ex. A

let A be a ring with 1

1a.

 f_x f_y

$$x \mapsto \bar{1}$$

$$x \mapsto \bar{0}$$

$$y \mapsto \bar{0}$$

$$y \mapsto \bar{1}$$

b.

$$f_x: \{x, y\} \rightarrow \mathbb{Z}/4\mathbb{Z}$$

$$x \mapsto \bar{a}$$

$$y \mapsto \bar{b}$$

 \bar{a} can equal \bar{b} , so

$$|f_x(B)| = 4 \cdot 4 = 16$$

c.

$$\bar{2} \cdot f = \bar{2} f_x$$

$$\bar{2} \cdot f(x) = \bar{1}$$

$$\bar{2} \cdot f(y) = \bar{2}$$

d. No because A is not a field

e. $\mathbb{D}: \bar{a}f_x + \bar{b}f_y$
 $\rightarrow \bar{a}\mathcal{D}(x) + \bar{b}\mathcal{D}(y)$
 $= \bar{a}(e_1 + e_2) + \bar{b}e_1$
 $= (\bar{a} + \bar{b})e_1 + \bar{a}e_2$

2a. $B = \{1_A\}$

b. $B = \{e_i \mid i = 1, \dots, n\}$

c. $B = \{x^n \mid n \in \mathbb{Z}_{\geq 0}\}$

3a. $x \in \mathbb{Q}$

$$\mathbb{Z}x = nx, \quad n \in \mathbb{Z}$$

b.

4a.