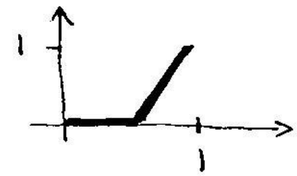
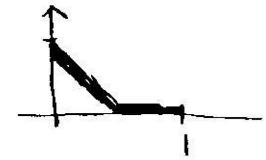
#10: (a) Take, e.g., $f(x) := \begin{cases} 0 & \text{if } x \le \frac{1}{2} \\ 2x-1 & \text{if } x \ge \frac{1}{2} \end{cases}$



$g(x) := \begin{cases} 1-2x & \text{if } x \le \frac{1}{2} \\ 0 & \text{if } x \ge \frac{1}{2} \end{cases}$



Neither f nor g are 0 (i.e. the additive identity in $C^0[0,1]$)

But $fg = 0$ (the function that vanishes <u>identically</u>, which is the zero element in $C^0[0,1]$)

(b) $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

(c) $(7,0) \cdot (0,3) = (0,0)$

(d), any pair of disjoint subsets is a pair of zero divisors;

eg: $A = \{\square, \lozenge\}$, $B = \{\star\}$

$AB = \emptyset$ where the empty set is the zero element in $\mathcal{P}(M)$

(e) <u>A</u>: • any set with one element : <u>4</u> possibilities

then B is any nonempty subset of $M \setminus A$ (3 elements)

$2^3 - 1 = \underline{\underline{7}}$ possibilities

<u>or</u>

• any set with 2 elements : <u>6</u> possibilities

then B is any nonempty subset of $M \setminus A$ (2 elements)

$2^2 - 1 = \underline{\underline{3}}$ poss.

<u>or</u>

• any set with 3 elements : <u>4</u> possibilities

then B is the remaining element only <u>1</u> possibility