iv) a) $[-\frac{1}{3}, 1]$

This can be expressed thus

$[-\frac{1}{3}, 1] = \{-\frac{1}{3}\} \cup (-\frac{1}{3}, 1]$

Thus if $(-\frac{1}{3}, 1]$ is open in $\{\mathbb{R}, d\}$

$[\frac{1}{3}, 1]$ is open in $\{\mathbb{R}, d\}$ since $B_{2/3}(\frac{1}{3})$ is an open ball in $\{\mathbb{R}, d\}$ from iii)

Try $B_4(1)$ (A very lucky guess!)

$2|x| + 2|1| + |x-1| < 4$

$2|x| + |x-1| < 2$ if $0 < x < 1$, $2x + 1 - x < 2$ $\therefore x < 1$

Easier to note $[\frac{1}{3}, 1] = B_{?}(1) \cup$ [illegible] (4B(ii)a)

If $x > 1$, $2|x| > 2$ $\therefore |x-1| < 0$ but $x > 1$

so we have a contradiction $\therefore x \leq 1$ (since

If $x = 1$, $d(1,1) = 0 < 4$

If $x \leq 0$

$2|x| + |x-1| = 2|x| + |x| + |1| < 2$

$3|x| < 1 \Rightarrow x > -\frac{1}{3}$

$\therefore (-\frac{1}{3}, 1]$ is open in $\{\mathbb{R}, d\}$ $\therefore$

3/3 $[-\frac{1}{3}, 1] = \{-\frac{1}{3}\} \cup (-\frac{1}{3}, 1]$, a union of open balls

$\therefore [\frac{1}{3}, 1]$ is open in $\{\mathbb{R}, d\}$ see opp.

b) $0 \in [0,1]$ but there is no $\varepsilon > 0$ such $B_\varepsilon(0)$ is open in $[0,1]$ since

3/2 $B_\varepsilon(0) = \{x \in \mathbb{R} : -\frac{\varepsilon}{3} < x < \frac{\varepsilon}{3}\}$ $\therefore [0,1]$ is not open in M. see opp.

1/1 5) i) $2E = kF$

1/1 ii) $2E = jV$

iii) From i) $E = \frac{kF}{2}$

From i) and ii)

$kF = jV = 2E$

$\therefore V = \frac{kF}{j}$

$X = F - E + V$

2/2 $X = F - \frac{kF}{2} + \frac{kF}{j} = F\left(1 - \frac{k}{2} + \frac{k}{j}\right) \Rightarrow X = F\left(1 - \frac{k}{2} + \frac{k}{j}\right)$