PR 10

1) (e) nuc now

$E = \frac{dU}{dr}$ $V = \frac{kQ}{r}$

2) (d), (b)

3)

s, $s\sqrt{2}$

$U_e = \frac{kQq}{r}$

$W_1 = 0$

$W_2 = \frac{kq^2}{s}$

$W_3 = \frac{kq^2}{s} + \frac{kq^2}{s\sqrt{2}}$

$W_4 = \frac{kq^2}{s} + \frac{kq^2}{s} + \frac{kq^2}{s\sqrt{2}}$

$W_{total} = 4\left(\frac{kq^2}{s}\right) + \frac{2}{\sqrt{2}}\left(\frac{kq^2}{s}\right)$

$= \frac{kq^2}{s}\left(4 + \frac{2\sqrt{2}}{2}\right)$

$= (4+\sqrt{2})\frac{kq^2}{s}$ (b)

4) (b) 5) $\Delta V = V_f - V_0$ (e)

6) 2 & 4 (c)

7) $\frac{E}{R} = \frac{a}{Q}$

$\frac{a}{4a} = \frac{Q_0}{Q_f}$ (d)

8) $C = \frac{Q}{V}$

$C = \frac{k\varepsilon_0 A}{d}$

Capacitance increases

Q unchanged

V decreases

U decreases (A)

9) $W = q\Delta V$

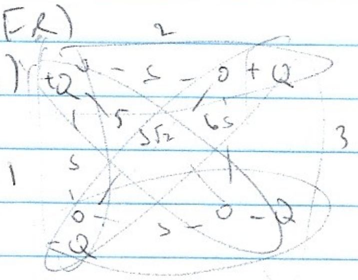
$= -0.05 \cdot -100$

$= 5$ J (e)

10) $C + \left(\frac{1}{2}C\right) + \left(\frac{1}{2}C\right) = 2C$ (d)

FR)

1)



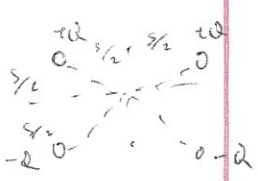
$U = \frac{kq_1q_2}{r}$

$U_1 = \frac{-kQ^2}{s}$ $U_2 = \frac{kQ^2}{s}$

$U_3 = \frac{-kQ^2}{s}$ $U_4 = \frac{kQ^2}{s}$

$U_5 = \frac{-kQ^2}{s\sqrt{2}}$ $U_6 = \frac{-kQ^2}{s\sqrt{2}}$

$U_{total} = -\frac{2}{\sqrt{2}}\frac{kQ^2}{s} = -\sqrt{2}\frac{kQ^2}{s}$



b) $E_1 = \frac{kQ}{(s/2)^2}(-j)$

$+ \frac{kQ}{(s/2)^2}(\hat{i})$