Answers Exam I 2018

1. $$\vec{F} = \frac{1}{4\pi\varepsilon_0}\left[\frac{q_1 q_4}{R^2}\sin\theta_1 + \frac{q_2 q_4}{R^2}\sin\theta_2 - \frac{q_3 q_4}{R^2}\right]\vec{i}_x + \frac{1}{4\pi\varepsilon_0}\left[-\frac{q_1 q_4}{R^2}\cos\theta_1 + \frac{q_2 q_4}{R^2}\cos\theta_2\right]\vec{i}_y$$

2. $$\vec{E} = \frac{Q}{4\pi\varepsilon_0(S^2 - a^2)}\vec{i}_x$$

3. $$V(x,y) = \frac{c}{5}\left[\frac{Q_1}{(x^2+y^2)^{5/2}} + \frac{Q_2}{((a-x)^2+(y-b)^2)^{5/2}}\right]$$

4. $\Phi_{front} = 0$

$\Phi_{back} = 0$

$\Phi_{left} = 0$

$\Phi_{right} = \alpha a b c$

$\Phi_{bottom} = 0$

$\Phi_{top} = \beta a b c$

$\alpha = -\beta$