6. The gravitational forces on m_5 from the two 5.00g masses m_1 and m_4 cancel each other. Contributions to the net force on m_5 come from the remaining two masses:

$$F_{\text{net}} = \frac{\left(6.67\times10^{-11}\ \text{N}\cdot\text{m}^2/\text{kg}^2\right)\left(2.50\times10^{-3}\ \text{kg}\right)\left(3.00\times10^{-3}\ \text{kg}-1.00\times10^{-3}\ \text{kg}\right)}{\left(\sqrt{2}\times10^{-1}\ \text{m}\right)^2}$$

$$= 1.67\times10^{-14}\ \text{N}.$$

The force is directed along the diagonal between m_2 and m_3, towards m_2. In unit-vector notation, we have

$$\vec{F}_{\text{net}} = F_{\text{net}}(\cos 45°\,\hat{\text{i}} + \sin 45°\,\hat{\text{j}}) = (1.18\times10^{-14}\,\text{N})\,\hat{\text{i}} + (1.18\times10^{-14}\,\text{N})\,\hat{\text{j}}$$