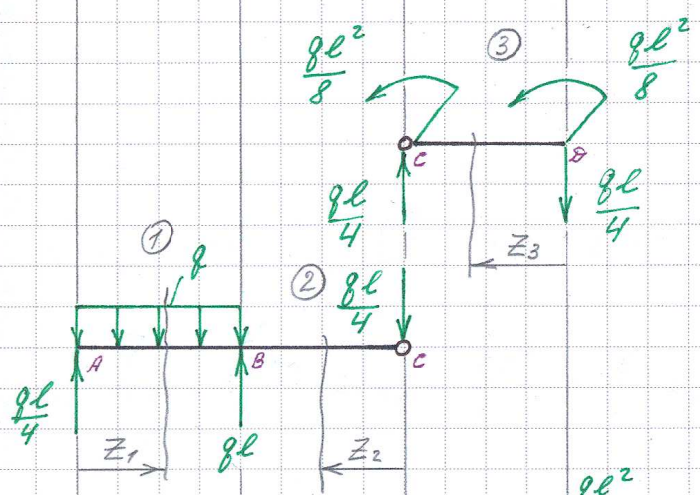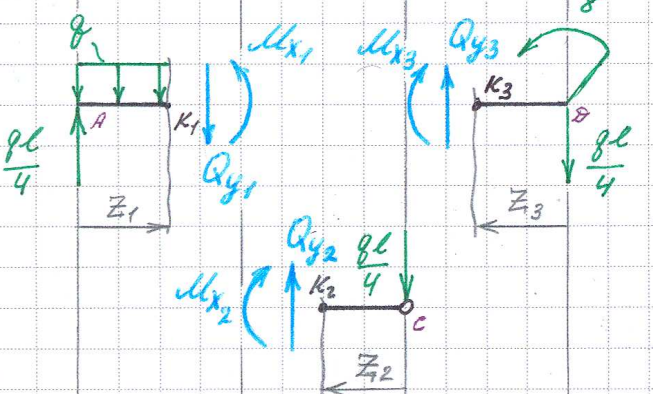Реакции в опорах $(Y_A, Y_Д, M_{RД}, Z_Д)$ и усилия в шарнире (Y_c, Z_c), находим, решая совместно систему шести уравнений равновесия (3 уравнения для части I и 3 уравнения для части II):
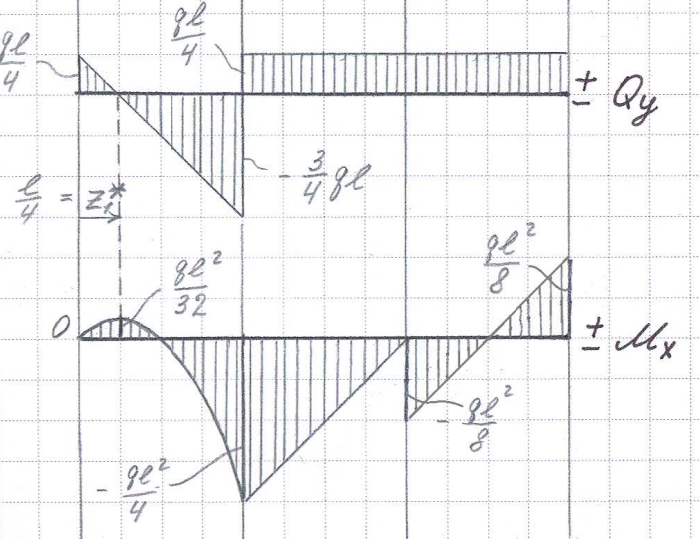
$$\text{(I)}\begin{cases} \sum F_z = 0 = Z_c & (1) \\[4pt] \sum M_c = 0 = ql\cdot\frac{3}{2}l - Y_A\cdot 2l - ql\cdot l & (2) \\[4pt] \sum M_A = 0 = -ql\cdot\frac{l}{2} + ql\cdot l - Y_c\cdot 2l & (3) \end{cases}$$

$$\text{(II)}\begin{cases} \sum F_z = 0 = Z_Д - Z_c & (4) \\[4pt] \sum M_c = 0 = \frac{ql^2}{8} - M_{RД} + Y_Д\cdot l & (5) \\[4pt] \sum M_Д = 0 = -M_{RД} + \frac{ql^2}{8} - Y_c\cdot l & (6) \end{cases}$$

Откуда:

$$Z_Д = Z_c = 0$$

$$Y_A = Y_c = \frac{ql}{4}$$

$$Y_Д = -\frac{ql}{4}$$

$$M_{RД} = -\frac{ql^2}{8}$$

РОЗУ:

$$\sum F_{y_1} = 0 = \frac{ql}{4} - q\,z_1 - Q_{y_1} \;\Rightarrow\; Q_{y_1} = q\left(\frac{l}{4} - z_1\right)$$

$$z_1 = 0: \quad Q_{y_1} = ql/4$$
$$z_1 = l: \quad Q_{y_1} = -\frac{3}{4}ql$$

$$\sum M_{x_1} = 0 = -\frac{ql}{4}z_1 + \frac{qz_1^2}{2} + M_{x_1} \;\Rightarrow\; M_{x_1} = \frac{q}{4}\left(lz_1 - 2z_1^2\right)$$

$$z_1 = 0: \quad M_{x_1} = 0$$
$$z_1 = l: \quad M_{x_1} = -\frac{ql^2}{4}$$

Экстремум параболы:

$$Q_{y_1}(z_1^*) = 0 = q\left(\frac{l}{4} - z_1^*\right) \quad\Rightarrow\quad \underline{z_1^* = \frac{l}{4}}$$

$$M_{x_1}(z_1^*) = M_{x_1}\left(\frac{l}{4}\right) = \frac{q}{4}\left(l \cdot \frac{l}{4} - 2\frac{l^2}{16}\right) = \underline{\frac{ql^2}{32}}$$

$$\sum F_{y_2} = 0 = Q_{y_2} - \frac{ql}{4} \quad\Rightarrow\quad Q_{y_2} = \frac{ql}{4}$$

$$\sum M_{K_2} = 0 = -M_{x_2} - \frac{ql}{4}z_2 \quad\Rightarrow\quad M_{x_2} = -\frac{ql}{4}\cdot z_2$$

$$z_2 = 0: \quad M_{x_2} = 0$$

$$z_2 = l: \quad M_{x_2} = -\frac{ql^2}{4}$$

$$\sum F_{y_3} = 0 = Q_{y_3} - \frac{ql}{4} \quad\Rightarrow\quad Q_{y_3} = \frac{ql}{4}$$

$$\sum M_{K_3} = 0 = -M_{x_3} + \frac{ql^2}{8} - \frac{ql}{4}\cdot z_3 \quad\Rightarrow\quad M_{x_3} = \frac{ql}{8}\left(l - 2\cdot z_3\right)$$

$$z_3 = 0: \quad M_{x_3} = \frac{ql^2}{8}$$

$$z_3 = l: \quad M_{x_3} = -\frac{ql^2}{8}$$