1. Find equations (general form \(ax + by + c = 0\)) of the three sides of the triangle with vertices 
\[A = (-1, -2), B = (3, 0)\) and \(C = (1, 4)\).

**SOLUTION** The general form of a line passing thorough the points \((x_1, y_1), (x_2, y_2)\) is 
\[
\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}.
\]
Thus the line \(L_1\) between \((-1, -2)\) and \((3, 0)\) is 
\[
L_1; \quad \frac{y + 2}{x + 1} = \frac{0 + 2}{3 + 1} \iff x - 2y - 3 = 0.
\]
The line \(L_2\) between \((3, 0)\) and \((1, 4)\) is 
\[
L_2; \quad \frac{y - 0}{x - 3} = \frac{4 - 0}{1 - 3} \iff -2x - y + 6 = 0.
\]
The line \(L_3\) between \((1, 4)\) and \((-1, -2)\) is 
\[
L_3; \quad \frac{y - 4}{x - 1} = \frac{-2 - 4}{-1 - 1} \iff 3x - y + 1 = 0.
\]

2. Find equations (depending on a parameter \(t\)) of the medians and their intersection (the centroid) of the triangle in the previous question.

**SOLUTION** Let \(M_1, M_2, M_3\) be the midpoints of the points \(A, B\) and \(B, C\), and \(C, A\) respectively. Then, clearly 
\[
M_1 = (1, -1), \quad M_2 = (2, 2), \quad M_3 = (0, 1).
\]
The line segment \(l_1(x, y)\) from \(C\) to \(M_1\) is 
\[
l_1(x, y); \quad (1 + t(1 - 1), 4 + t(-1 - 4)) = (1, 4 - 5t), \quad 0 \leq t \leq 1.
\]
The line segment \(l_2(x, y)\) from \(A\) to \(M_2\) is 
\[
l_2(x, y); \quad (-1 + t(2 - (-1)), -2 + t(2 - (-2))) = (-1 + 3t, -2 + 4t), \quad 0 \leq t \leq 1.
\]
The line segment \(l_3(x, y)\) from \(B\) to \(M_3\) is 
\[
l_3(x, y); \quad (3 + t(0 - 3), 0 + t(1 - 0)) = (3 - 3t, t), \quad 0 \leq t \leq 1.
\]
The centroid (barycenter) of the triangle can be found on any \(l_1 \cap l_2, l_2 \cap l_3\) or \(l_1 \cap l_3\). Using the first one we obtain \(1 = -1 + 3t\) and hence the ratio is \(t = 2/3\). Now putting this ratio on any line gives the barycenter of the triangle 
\[
(1, 4 - 5 \cdot \frac{2}{3}) = (1, \frac{2}{3}).
\]