$m = 23$, $n = 31$

$a = 2$, $b = 3$, $c = 3$, $d = 1$

$F = ac = 6$

$G = bd = 3$

$H = (a+b)(c+d) = 20$

$K = H - F - G$

$= 20 - 6 - 3$

$= 11$

$mn = 100(6) + 10(11) + 3$

$= 713$

$128 + 64 + 32 + 8 + 4 + 1$

$= 11101101$

$a = 72$

$b = 42$

$a = qb + r$

$72 = (1)(42) + 30$

$42 = (1)(30) + 12$

$30 = (2)(12) + 6$

$42 = (2)(6) + 0$

$\downarrow$

$HCF = (42, 72) = 6$

$(4, 2, 1)$

$\vec{r}(t)\ \hat{i} + 3\hat{j} - \hat{k} + t(-3\hat{i} + \hat{j} - 2\hat{k}),\ t \in \mathbb{R}$

$P = 4\hat{i} + 2\hat{j} + \hat{k}$

$-3t + 1 = 4,\ t = -1$

$t + 3 = 2,\ t = -1$

$-2t - 1 = 1,\ t = -1$ //

$(3, -3, -4)$

$\vec{r}(t) = 6\hat{i} + 3\hat{j} - \hat{k} + t(\hat{i} + 2\hat{j} + \hat{k})$

$t + 6 = 3,\ t = 3$

$2t + 3 = -3,\ t = -3$

$t - 1 = -4\ \ t = -3$ //

$\overrightarrow{OA} = \hat{i} + \hat{j}$

$\overrightarrow{OB} = \hat{i} + 3\hat{j}$

$\vec{r}(t) = \hat{i} + \hat{j} + t(2\hat{j})$

$\overrightarrow{OA} = \hat{i} - 3k,\ \overrightarrow{OB} = 2\hat{i} + \hat{j} - k$

$\vec{r}(t) = \hat{i} - 3\hat{k} + t(\hat{i} + 4\hat{j} - \hat{k})$

$= (t+1)\hat{i} + (4t)\hat{j} + (-t-3)\hat{k}$

$x = t + 1,\ y = 4t,\ z = -t - 3$

$t = x - 1,\ t = \frac{y}{4},\ t = -z - 3$

$x - 1 = \frac{y}{4} = -z - 3$