1. $G_0(s)=\frac{K(s+5)}{s(s+2)}$

(1)① 开环极点 $p_1=0$, $p_2=-2$, $n=2$

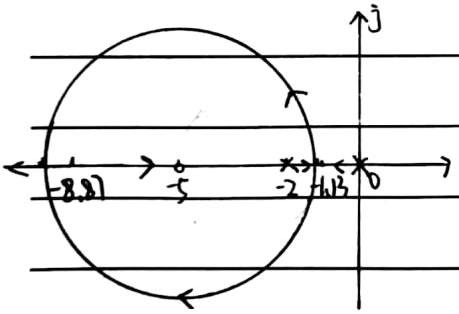
开环零点 $z_1=-5$, $m=1$

② 实轴上根轨迹为 $[-2,0]$, $(-\infty,-5]$

③ 分离点坐标 $\frac{1}{d}+\frac{1}{d+2}=\frac{1}{d+5}$ $\Rightarrow d^2+10d+10=0$

$d_1=-1.13$, $d_2=-8.87$

④ 根轨迹渐近线 $\sigma_a=\frac{0-2}{2-1}=3$, $\varphi_a=(2k+1)\pi=\pi$



(2) $\Phi(s)=\frac{1}{1+G_0(s)}=\frac{1}{1+\frac{K(s+5)}{s(s+2)}}$

考虑分离点所对应的根轨迹增益值 $K=\frac{s(s+2)}{(s+5)}$

$=\frac{s(s+2)}{s^2+(2+K)s+5K}$

说明圆心和半径