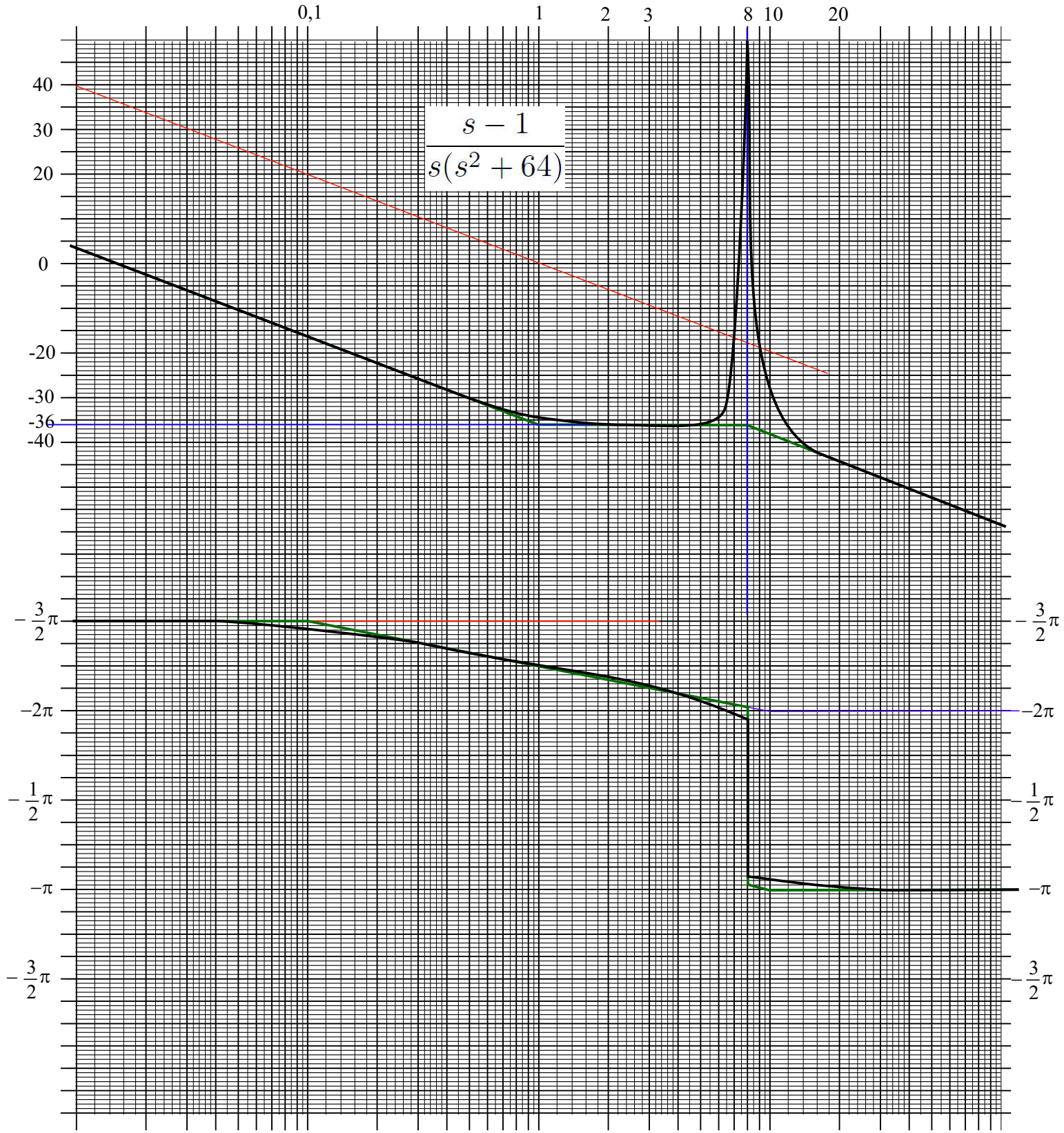
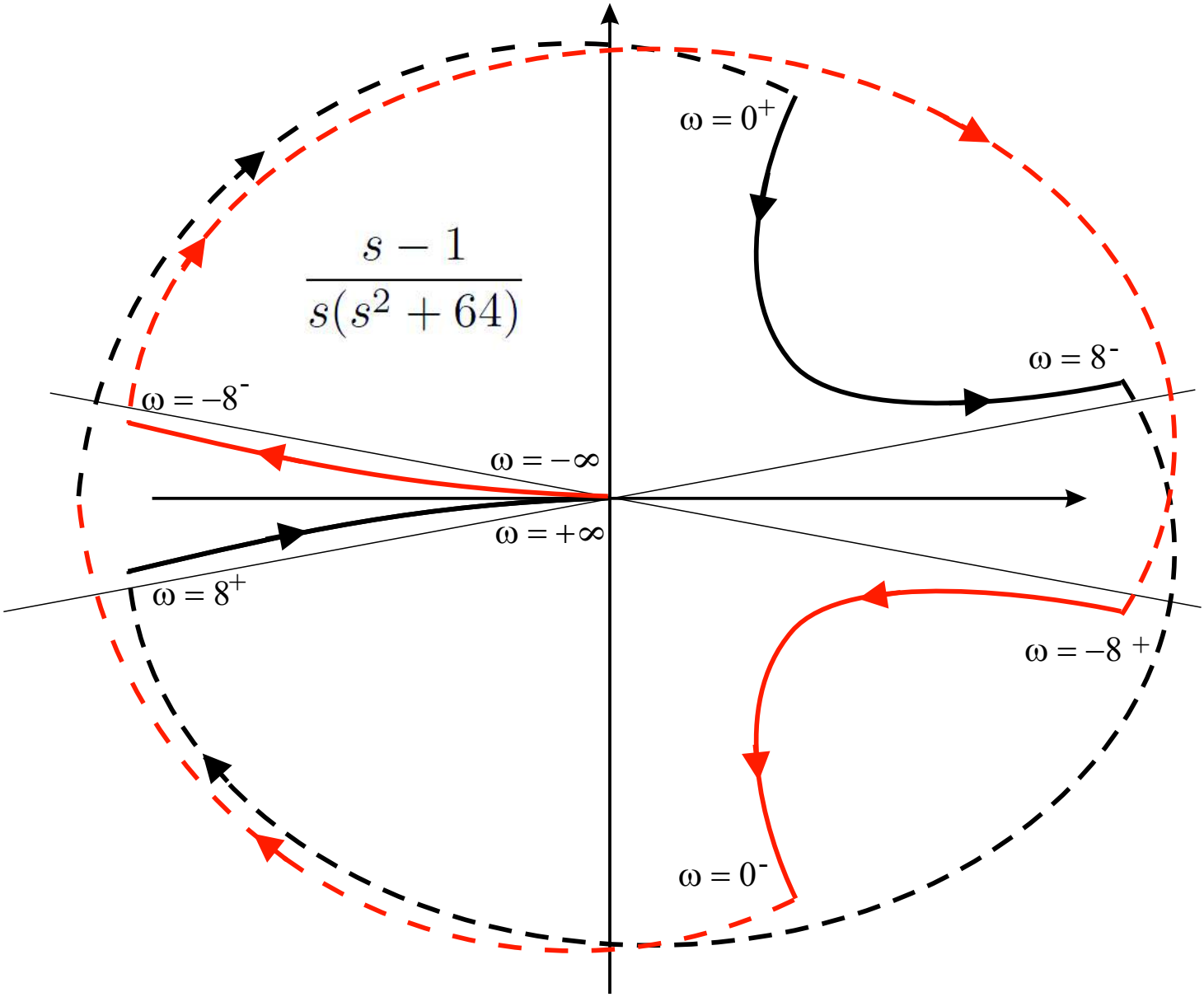

0,1
1
2
3
8
10
20
40
30
20
0
-20
-30
-36
-40
$\frac{s-1}{s(s^2+64)}$
$-\frac{3}{2}\pi$
-2π
$-\frac{1}{2}\pi$
$-\pi$
$-\frac{3}{2}\pi$

Teoria dei Sistemi: compito scritto del 18 novembre 2013



Nyquist Formula: $p_{ch} = p_{ap} - N$
where:
p_{ap}: number of poles with positive real part of the **open loop** transfer function $W(s)$
p_{ch}: number of poles with positive real part of the **closed loop** transfer function $W(s)/(1+W(s))$
N counts the number of encirclement of the point $-1+j0$ made by the graph of $W(j\omega)$
N positive for counterclockwise encirclements

In the problem, $p_{ap} = 0$.
For $K>0$ we have $N=-1$, and therefore $p_{ch}=1$ (instability of the closed loop system)
For $K<0$ we have $N=-2$, and therefore $p_{ch}=2$ (instability of the closed loop system)

Thus, the closed loop system is unstable for any feedback gain K.