Question 1:

(a) (i) $\left|\frac{j+1}{j+\sqrt{3}}\right| = \frac{1}{2}$

$\angle G(j) = \angle(j+1) - \angle(j+\sqrt{3}) = 45^\circ - 30^\circ = +15^\circ$

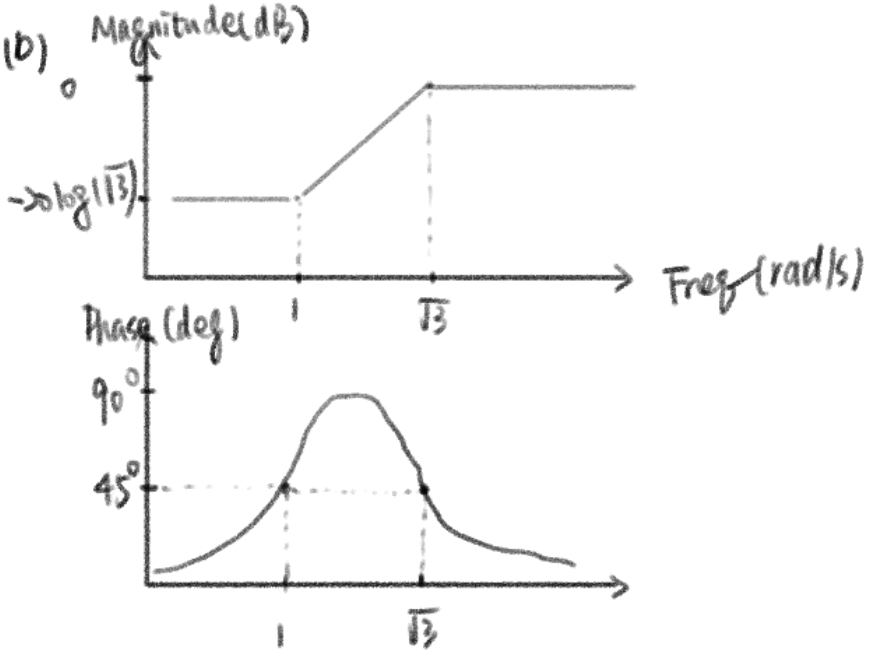
(ii) $|G(100j)| = \left|\frac{100j+1}{100j+\sqrt{3}}\right| = 0.9999$

$\angle G(j) = \angle(100j+1) - \angle(100j+\sqrt{3}) = 0.42^\circ$

(iii) $|G(0.1j)| = \left|\frac{0.1j+1}{0.1j+\sqrt{3}}\right| = \sqrt{\frac{0.01+1}{0.01+3}} = 0.58$

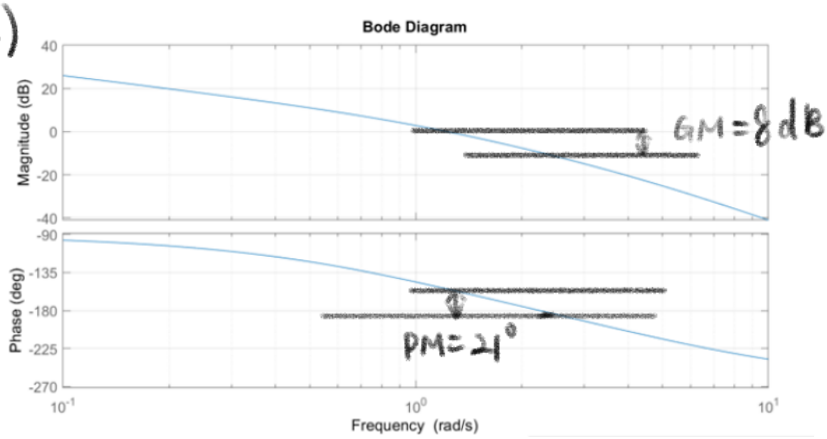
$\angle G(0.1j) = \angle(0.1j+1) - \angle(0.1j+\sqrt{3}) = 2.91^\circ$

(b)

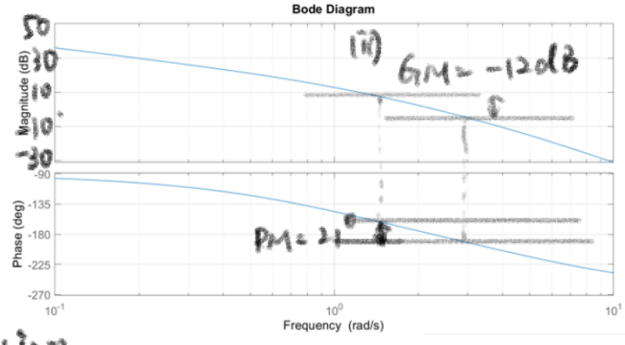


Question 2

(a)



(b) (i)



(ii) The PM is just the same.

(c) If K is too large, the system would be unstable.

$K \leq 10 \times 10^{8/20} = 25.12$