

國立臺北科技大學 100 學年度碩士班招生考試

系所組別：1112 機電整合研究所甲組

第二節 自動控制 試題 (選考)

第一頁 共一頁

注意事項：

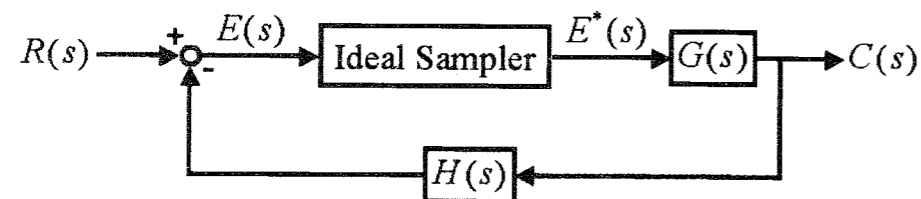
1. 本試題共四題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Please explain each of the following statements.

- (a) (10%) The dynamical system is controllable and observable.
- (b) (10%) The linear time-invariant system is detectable and stabilizable.
- (c) (5%) The Kalman decomposition theorem could be used to identify the unobservable modes of a linear time-invariant system.
- (d) (5%) The separation principle could be used to obtain a simple design of the state feedback gain of an observer-based state-feedback control system.

2. Let $E(s)$ denote the input of an ideal sampler, and let $E^*(s)$ be the corresponding output.

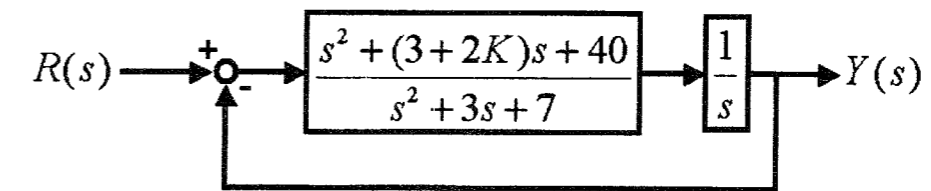
Given the block diagram of a discrete-data control system shown below,



(a) (10%) Draw the equivalent signal flow graph of the system.

(b) (10%) Derive the closed-loop transfer function $G(z) = \frac{C(z)}{R(z)}$.

3. Consider the block diagram shown below:

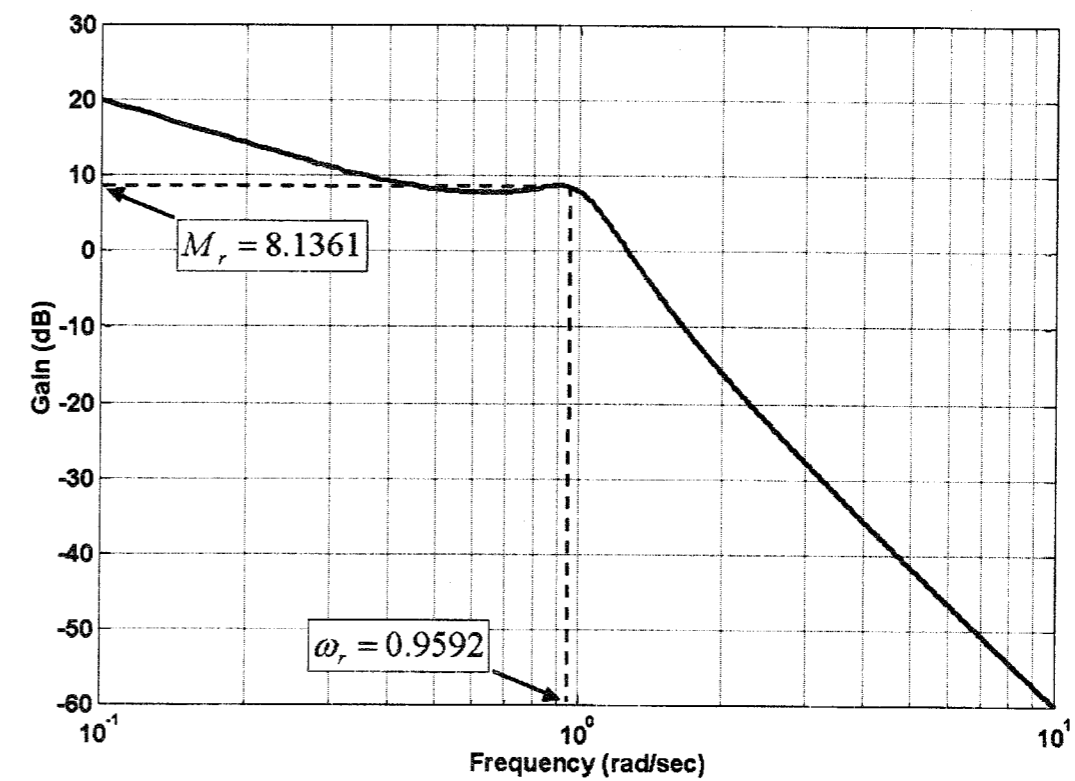


(a) (15%) Sketch the root locus for $K \geq 0$.

(b) (10%) Determine the range of K that makes the closed-loop system stable.

4. Given the magnification curve of $|G(j\omega)|_{dB}$ for the transfer function $G(s)$ as shown

below,



(a) (15%) Determine the transfer function $G(s)$.

(b) (10%) Sketch the phase plot of $G(s)$.