

參考用

1. Try to answer the following questions.
  - (1) Show that state feedback does not alter the controllability of the open-loop system. (10%)
  - (2) Show that the system observability is invariant for output feedback and not for state feedback. (15%)
2. Given the system transfer function  $H(s) = \frac{1}{s+1}$ , find the response to an input that begins at  $t=0$  as  $u(t) = \sin(10t)$ . (25%)
3. How many right half plane poles are there in the following closed-loop transfer function. (25%)

$$T(s) = \frac{10}{s^5 + 7s^4 + 6s^3 + 42s^2 + 8s + 56}$$

4. Given the closed-loop transfer function below, find the gain  $K$  (10%) and the frequency (10%), for which the root locus crosses the imaginary axis. For what  $K$  is the system stable? (5%)

$$T(s) = \frac{K(s+3)}{s^4 + 7s^3 + 14s^2 + (8+K)s + 3K}$$