1. What is the expected time for the step response of the following system to settle to within 5% of its final value? (20%)

$$G(s) = \frac{100}{s^2+4s+100}$$

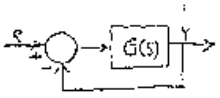
參考用

2. what is the effect of a right half-plane zero on the system response? (10%)

3. Given $G(s) = \frac{6}{s+2}$ find the steady-state response to $u(t) = 4\sin 4t$. (10%)

4. Find the values of K and T for which the system shown in the following figure is stable when G(s) is given by

$$G(s) = \frac{9K(s+T)^2}{s^3}$$




(20%)

5. Given that $G_p(s) = \frac{s+1}{s(s-1)(s+20)}$

please answer the following questions.

(a) The origin of the asymptotes is _____. (5%)

(b) breakaway points: _____. (5%)

(c) The angles that the asymptotes make with the real axis are (list all) _____. (5%)

(d) The number of excess poles is _____. (5%)

6. Given

$$\underline{A} = \begin{bmatrix} -1 & 2 \\ -2 & -2 \end{bmatrix}, \quad \underline{b} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \quad \underline{c}^T = [1 \quad 0]$$

find the phase-variable representation and check its stability. (20%)