

淡江大學八十九學年度碩士班招生考試試題

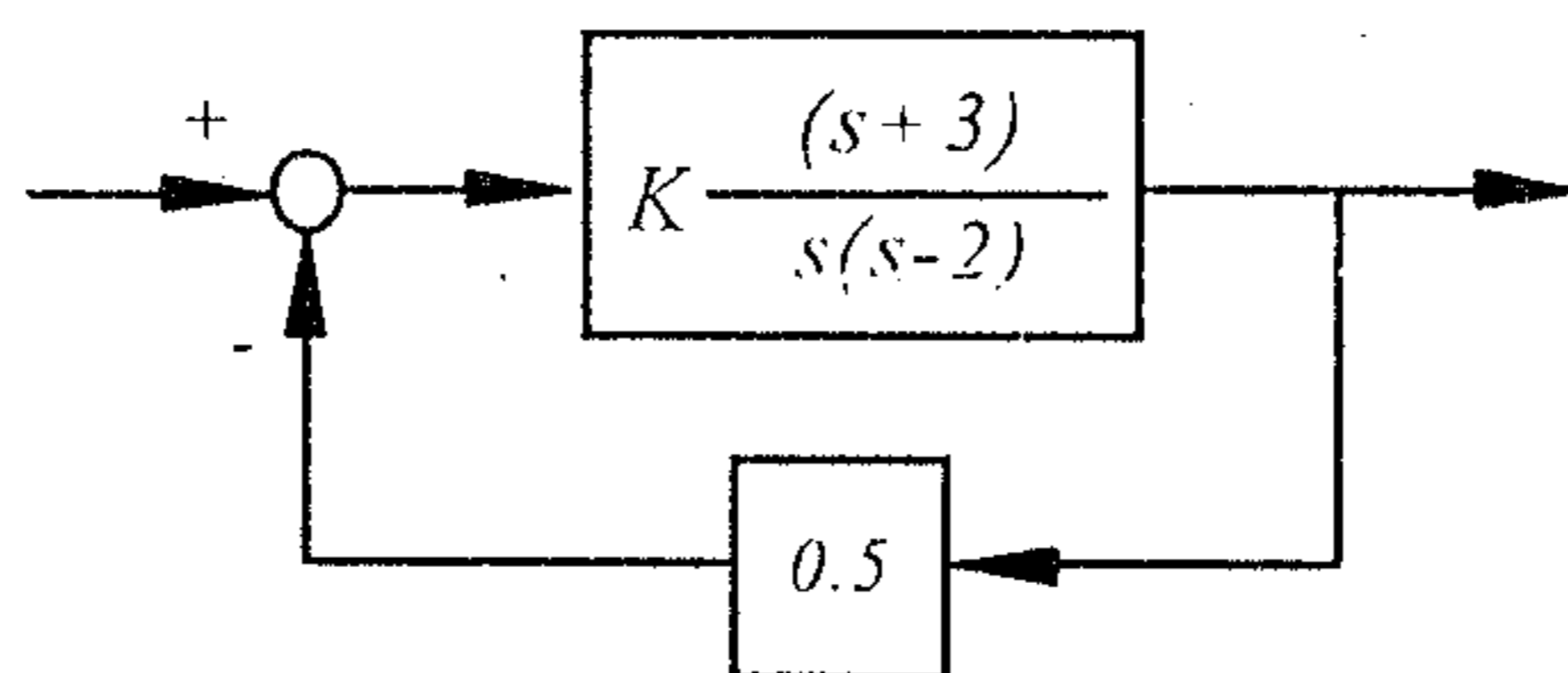
系別：機械工程學系

科目：自動控制

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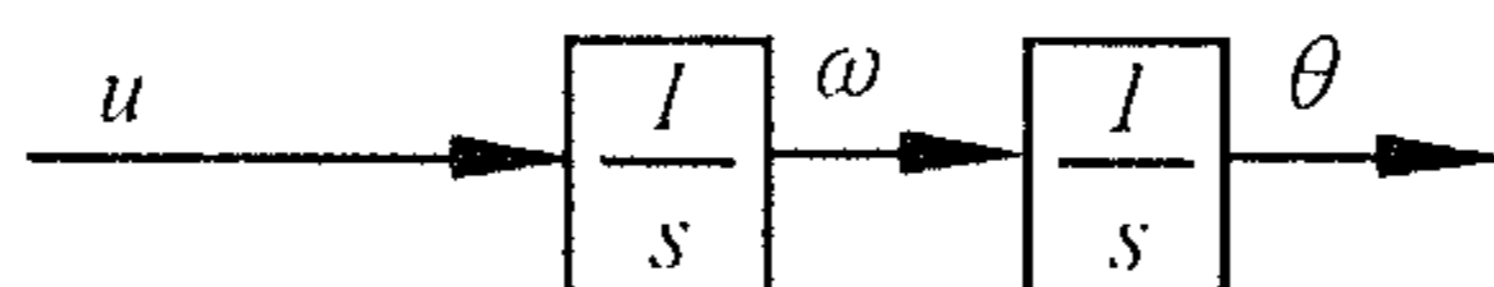
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1. (20%) Consider the system shown in the following figure, find the root locus of the system when $K > 0$? What is the range of K for which the system is stable?

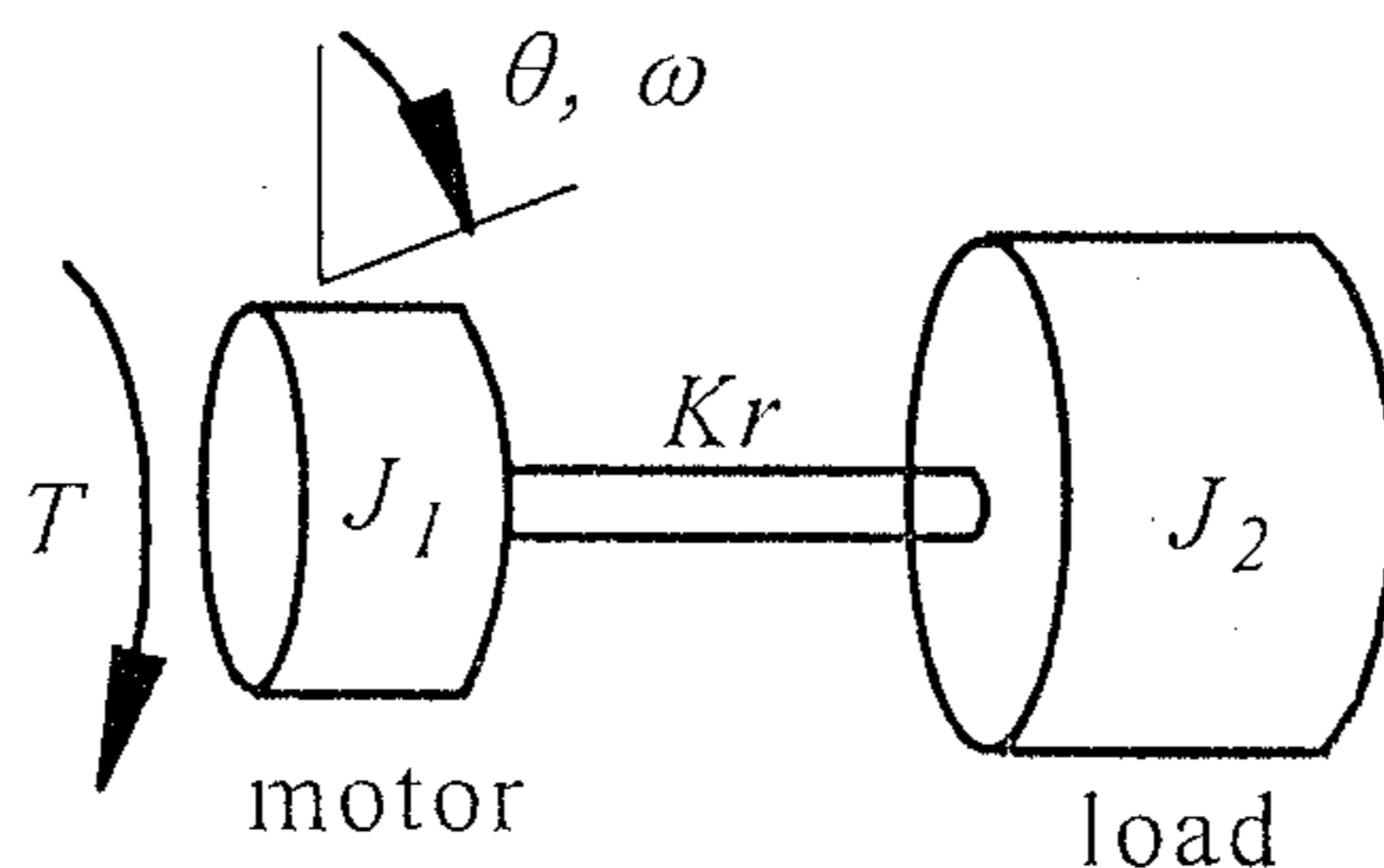


2. (10%) Sketch the Bode diagram for the transfer function: $G(s) = \frac{40s}{(s+1)(s+20)}$
3. (30%) Given the double integrator system shown below, design a closed loop controller for θ , the performance required is:
- a) no overshoot for step input
 - b) no steady state error for step θ command
 - c) bandwidth of the closed loop system = 10 rad/sec.
 - d) rise time as short as possible

You may use θ , ω , or both θ and ω as feedback for the controller, and may not use derivative operation in the controller.



4. (30%) A motor-load system connected with a shaft is shown below. Let J_1 and J_2 be the inertia of motor and load respectively, K_r is the spring constant of the connection shaft, and T is the motor generated torque. Find $\frac{\theta(s)}{T(s)}$ and sketch its Bode diagram (approximate)?



◀ 注意背面尚有試題 ▶

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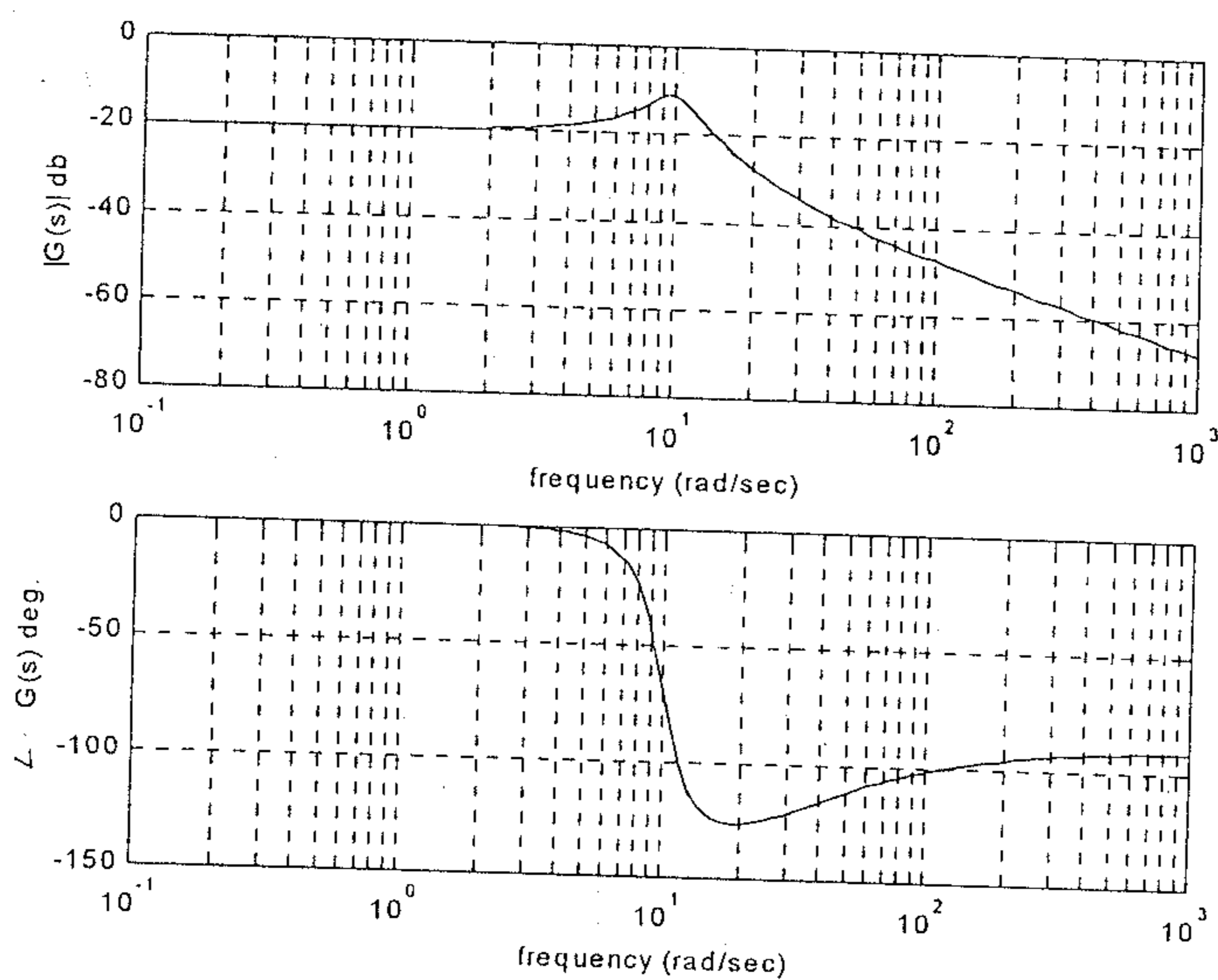
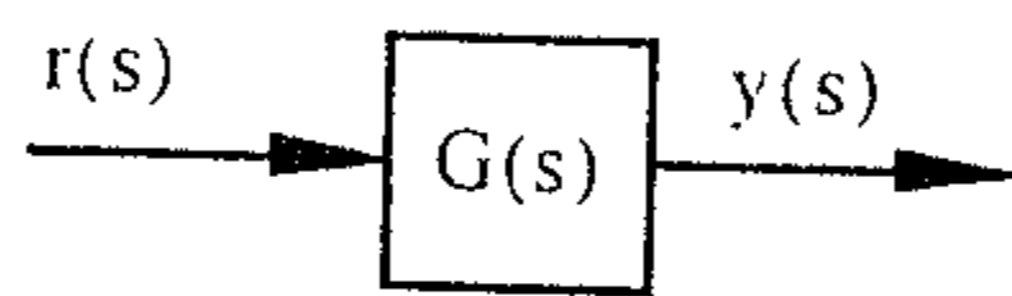
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5. (10%) The frequency response of a closed-loop control system is shown below, where $|G(s)|$ and $\angle G(s)$ are the magnitude and phase plots of the system separately, find $y(t)$ when $r(t) = 10 \sin(40 t)$?



◀ 注意背面尚有試題 ▶