

### Homework#3

For 01205205 –General Electronics II: sec 1-2

Name.....

I.D. ....

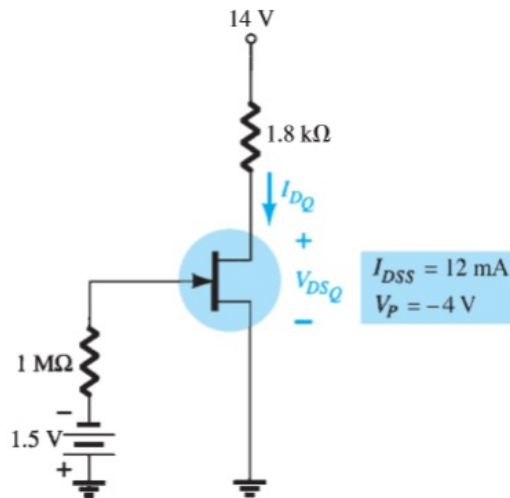
**Due Date: March 23, 2018 (no late submission after 2.00 pm)!!**

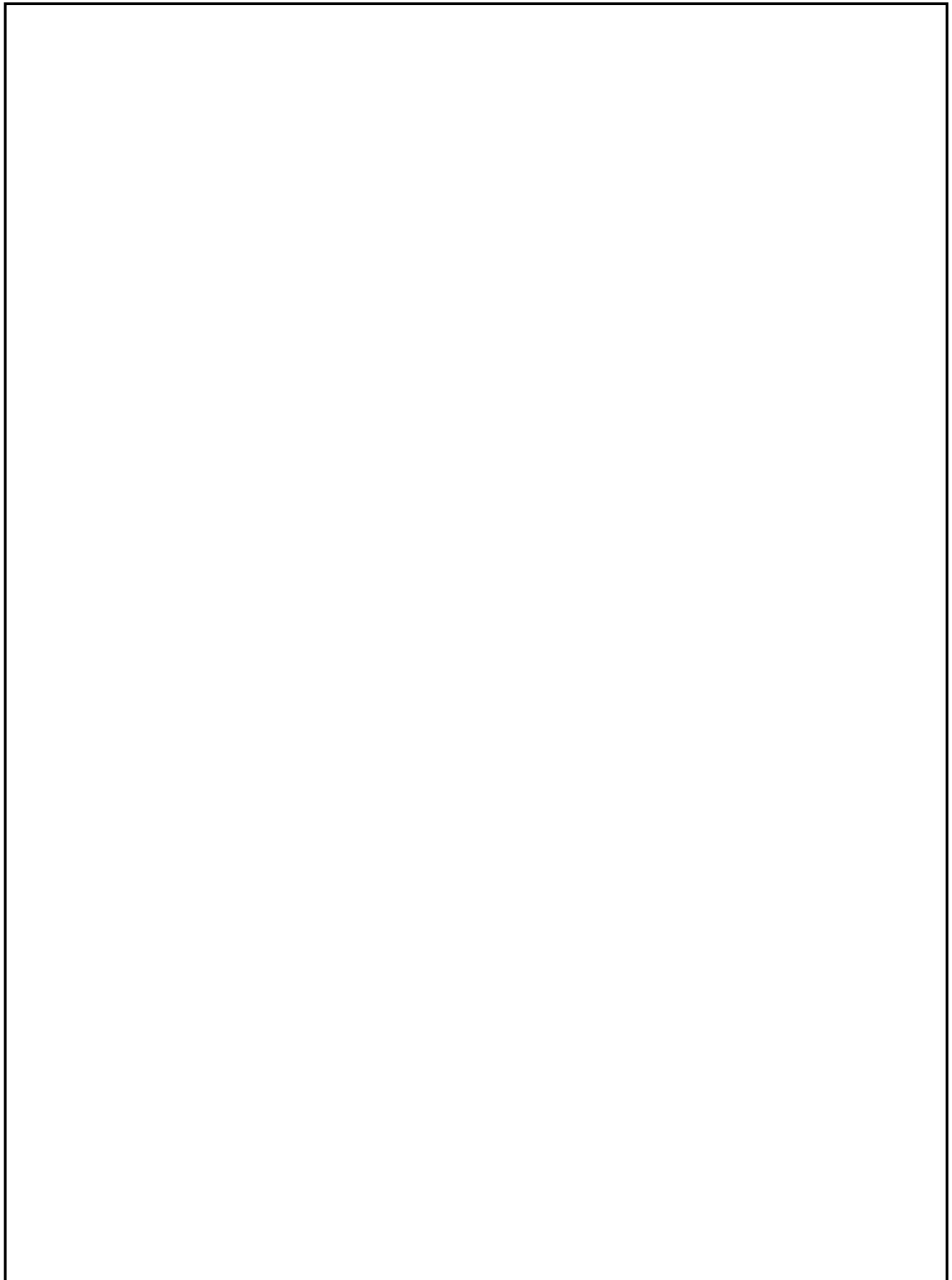
<b>Problem#</b>	<b>Points</b>
1	
2	
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### Homework # 3 due date 5-2-2017

1. For the fixed-bias configuration of Figure:

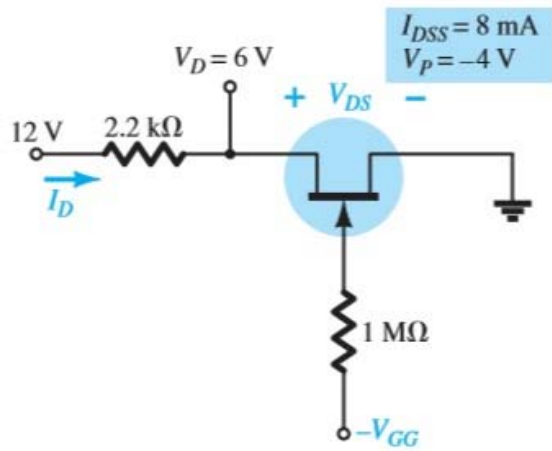
- Sketch the transfer characteristics of the device.
- Superimpose the network equation on the same graph.
- Determine  $I_{D_Q}$  and  $V_{DS_Q}$ .
- Using Shockley's equation, solve for  $I_{D_Q}$  and then find  $V_{DS_Q}$ . Compare with the solutions of part (c).





2. Given the measured value of  $V_D$  in Figure, determine;

**\*\*Please show clearly methods, and circle your answers with pen, then write your answer in the provided (red) box.**

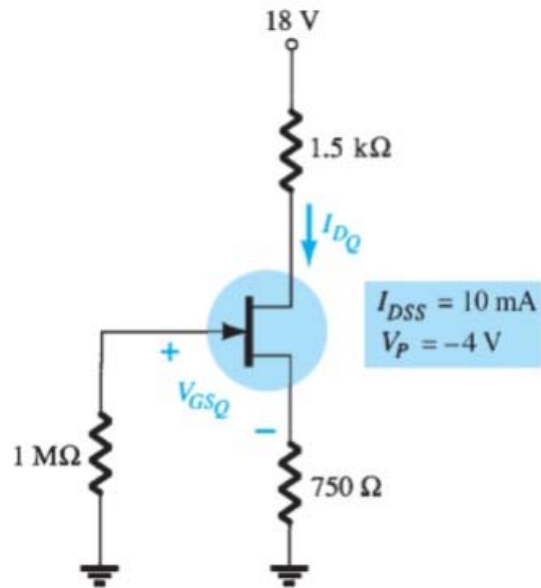


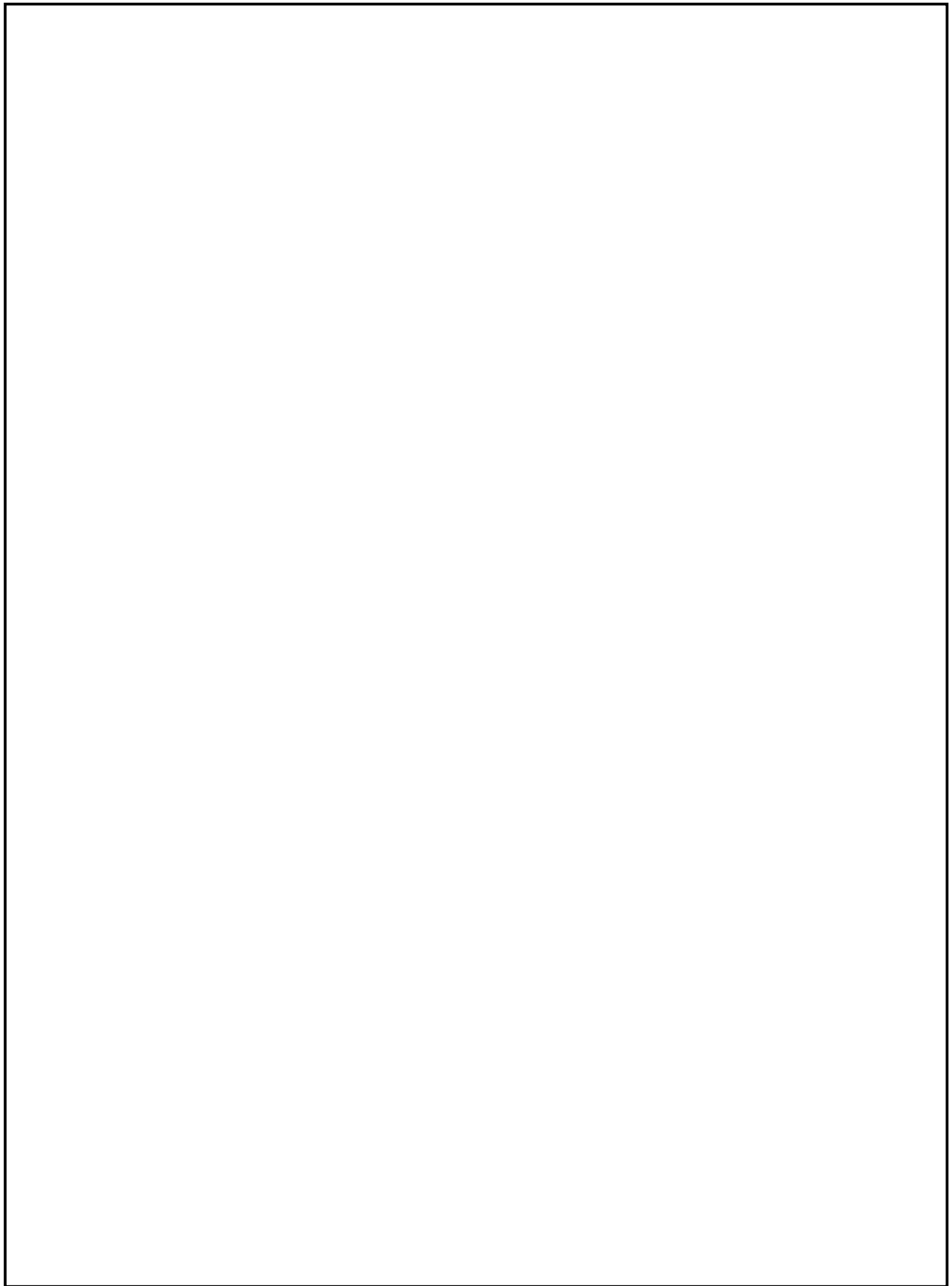
a)  $I_D = \dots\dots\dots$

b)  $V_{DS} = \dots\dots\dots$

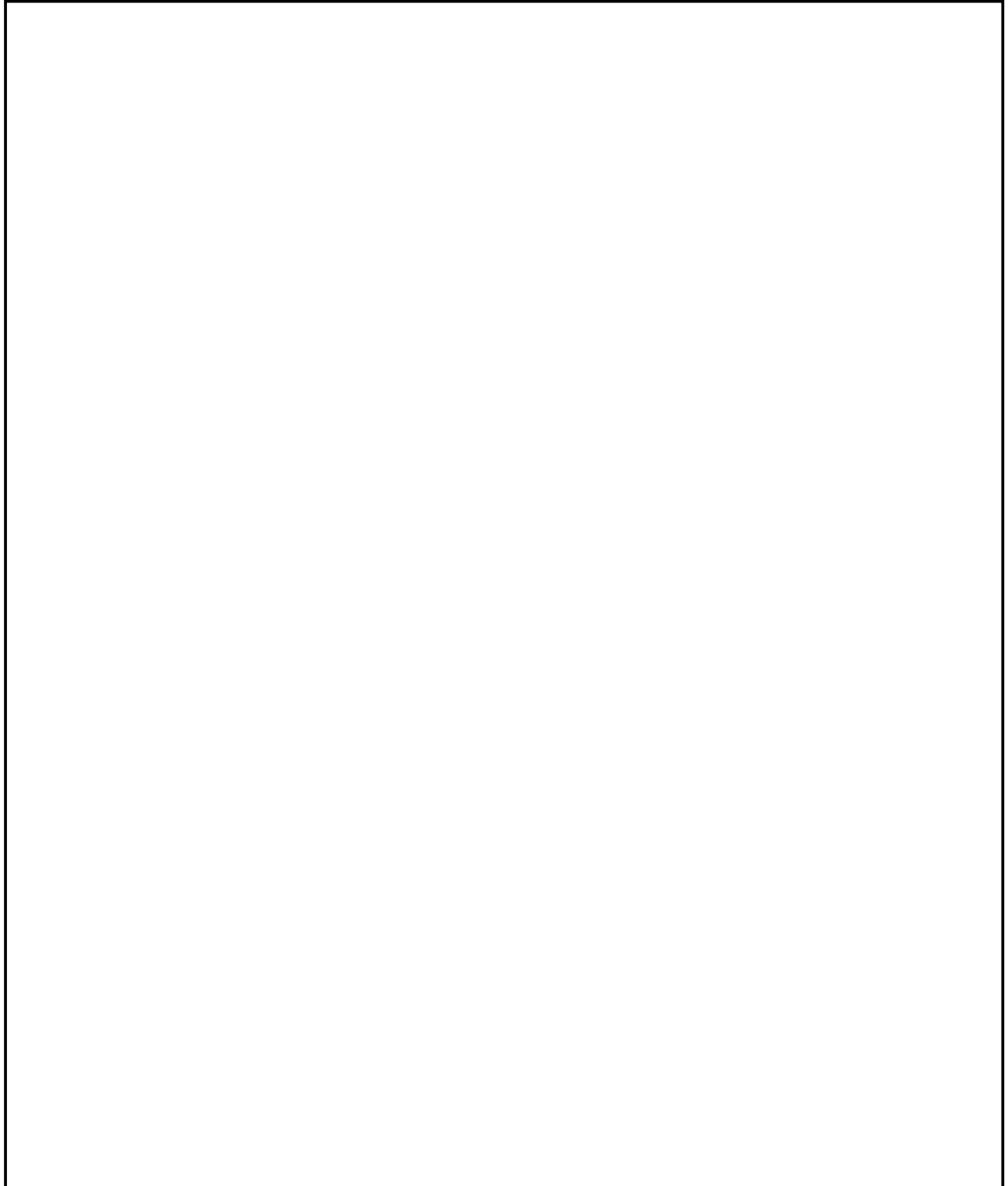
c)  $V_{GG} = \dots\dots\dots$

3. For the self-bias configuration of Figure:
- Sketch the transfer curve for the device.
  - Superimpose the network equation on the same graph.
  - Determine  $I_{D_Q}$  and  $V_{DS_Q}$ .
  - Calculate  $V_{DS}$ ,  $V_D$ ,  $V_G$ , and  $V_S$ .

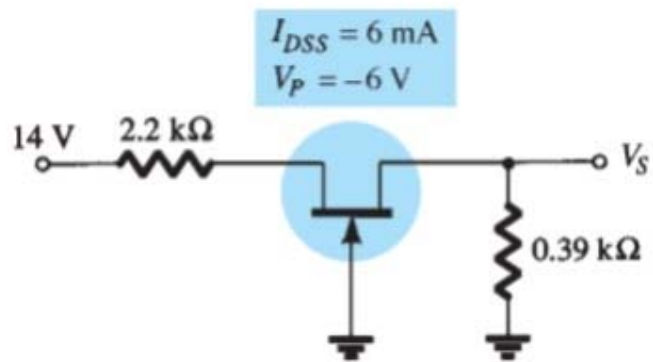




4. Determine  $I_{D_Q}$  for the network of Figure (Problems 3) using a purely mathematical approach. That is, establish a quadratic equation for  $I_D$  and choose the solution compatible with the network characteristics. Compare to the solution obtained in Problem 3.



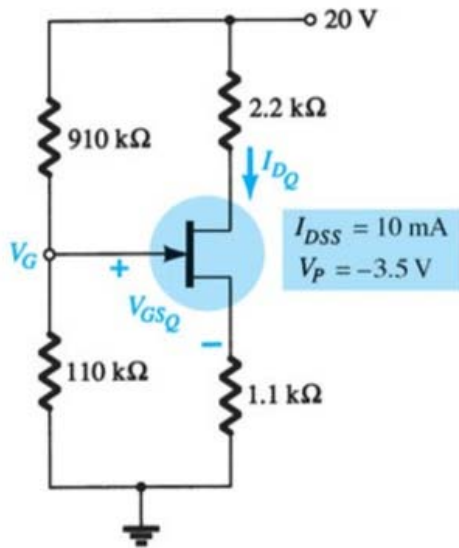
5. Find  $V_s$  for the network of Figure.





6. For the network of Figure, determine:

**\*\*Please show clearly methods and circle your answers with pen, then write your answer in the provided (red) box.**



a)  $V_G = \dots\dots\dots$

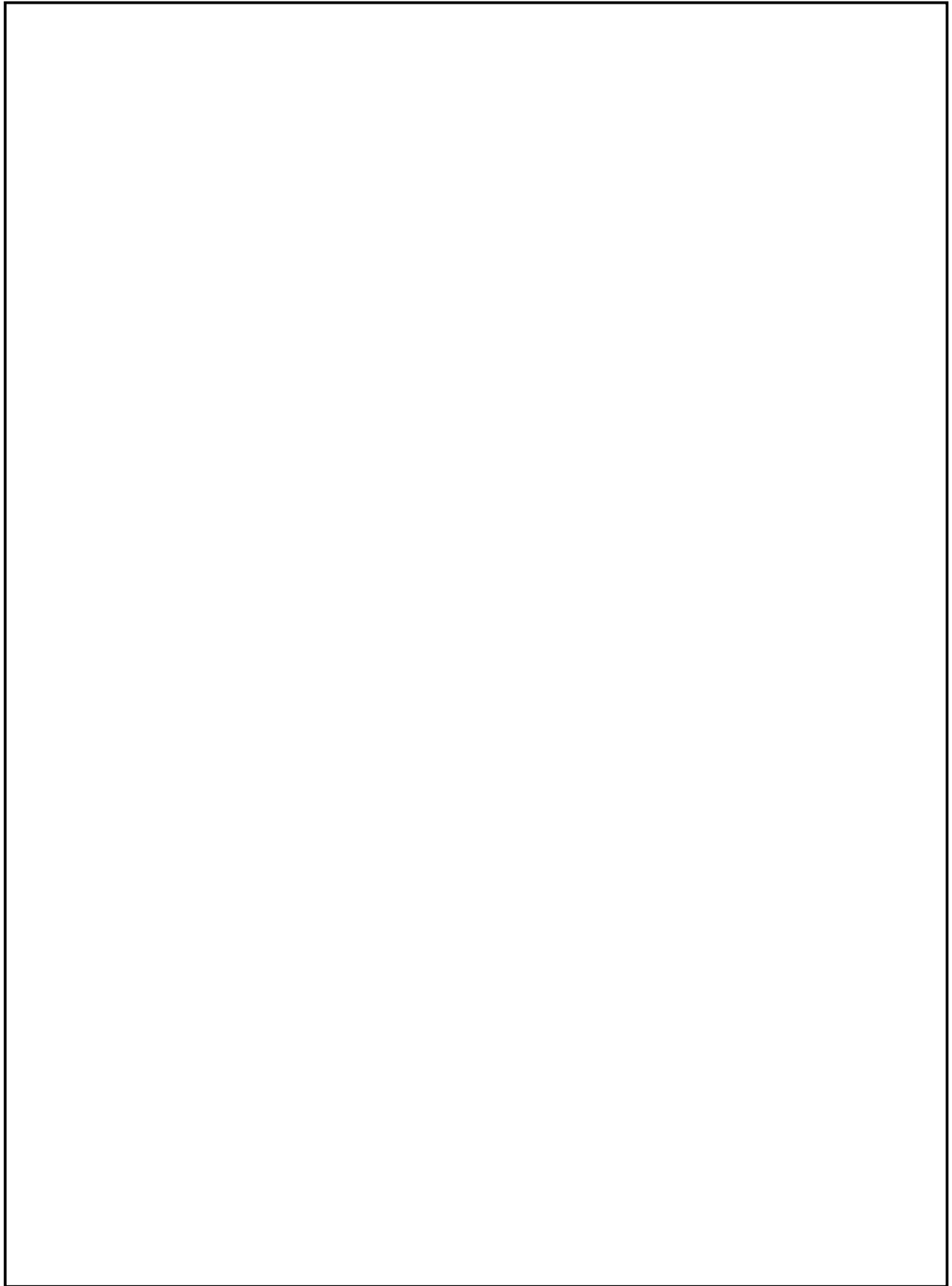
b)  $I_{D_Q} = \dots\dots\dots$

c)  $V_{GS_Q} = \dots\dots\dots$

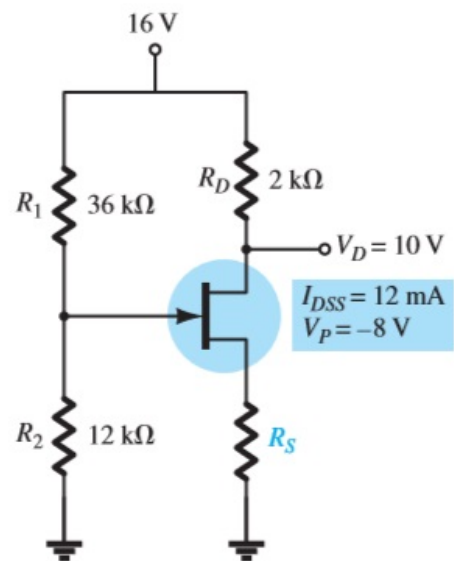
d)  $V_D = \dots\dots\dots$

e)  $V_S = \dots\dots\dots$

f)  $V_{DS_Q} = \dots\dots\dots$

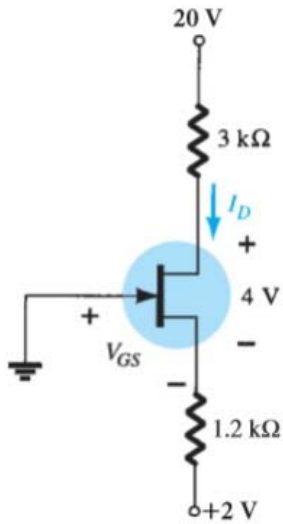


7. Determine the value of  $R_S$  for the network of Figure to establish  $V_D = 10\text{ V}$ .



8. Given  $V_{DS} = 4\text{ V}$  for the network of Figure, determine:

**\*\*Please show clearly methods and circle your answers with pen, then write your answer in the provided (red) box.**



a)  $I_D = \dots\dots\dots$

b)  $V_D = \dots\dots\dots$

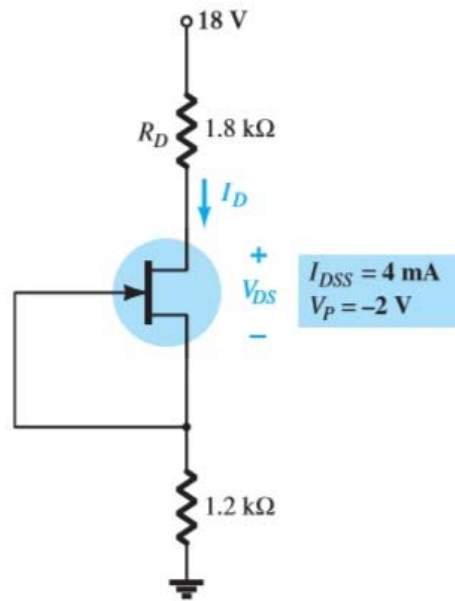
c)  $V_S = \dots\dots\dots$

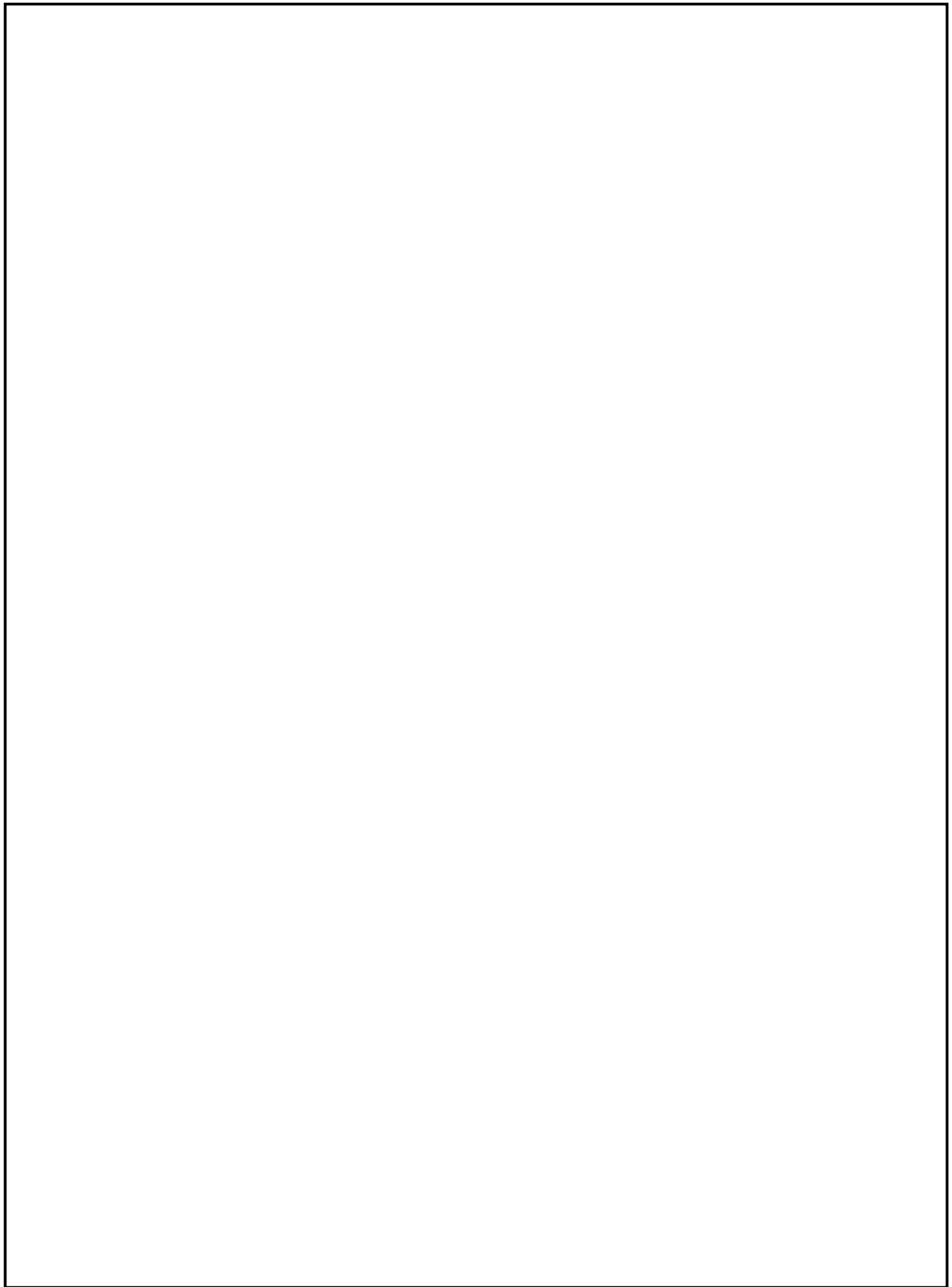
f)  $V_{GS} = \dots\dots\dots$

Special Case:  $V_{GS_Q} = 0 \text{ V}$

9. For the network of Figure.

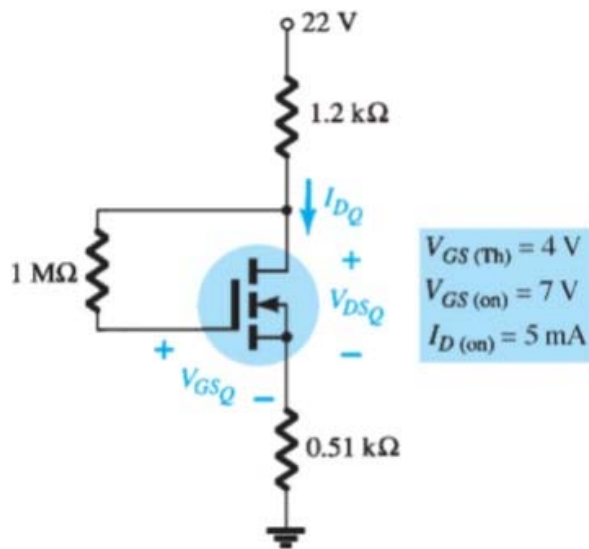
- Find  $I_{D_Q}$ .
- Determine  $V_{D_Q}$  and  $V_{DS_Q}$ .
- Find the power supplied by the source and dissipated by the device.





10. For the network of Figure, determine:

**\*\*Please show clearly methods and circle your answers with pen, then write your answer in the provided (red) box.**



a)  $I_{DQ} = \dots\dots\dots$

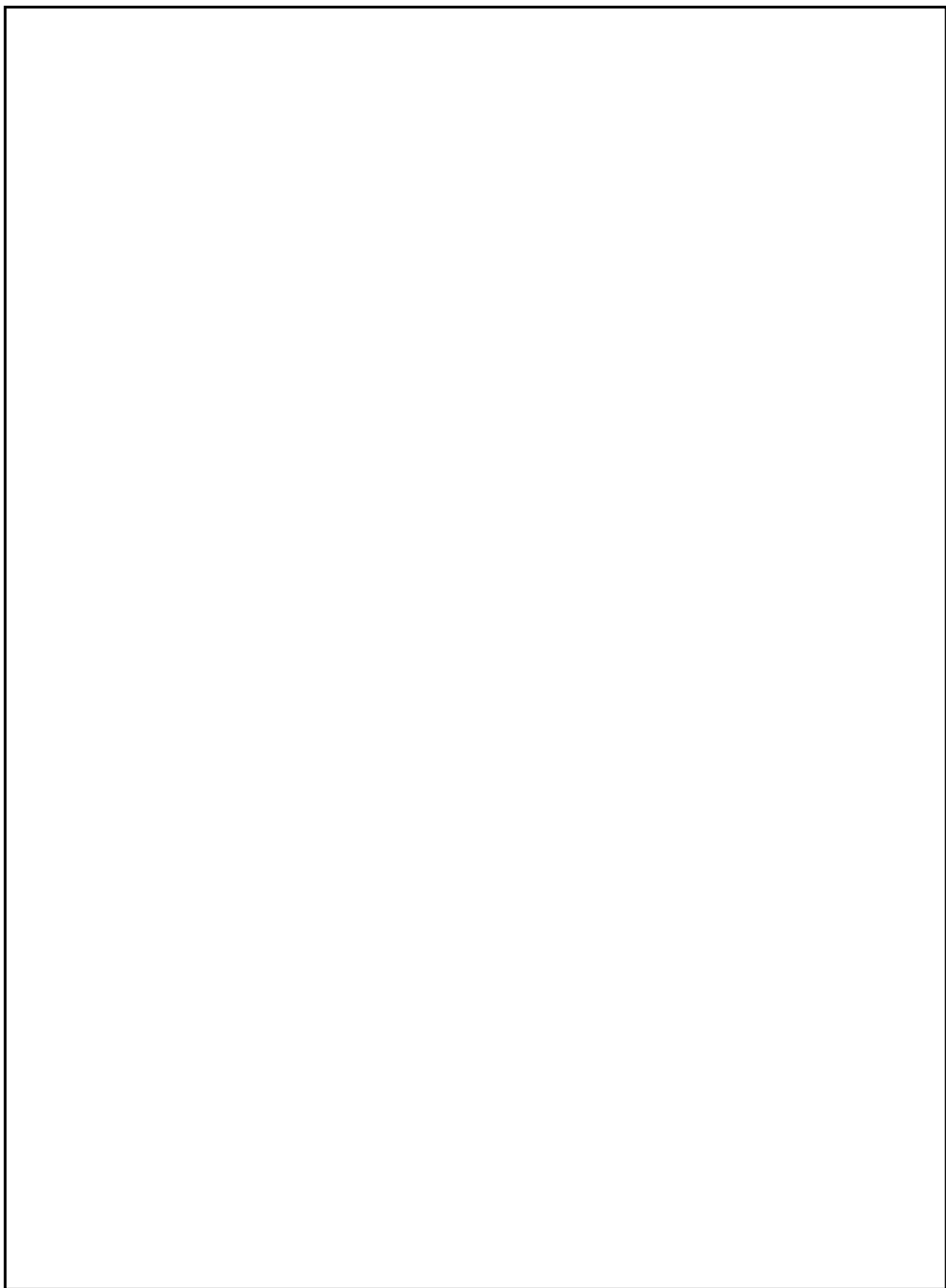
b)  $V_{GSQ} = \dots\dots\dots$

c)  $V_{DSQ} = \dots\dots\dots$

d)  $V_D = \dots\dots\dots$

e)  $V_S = \dots\dots\dots$

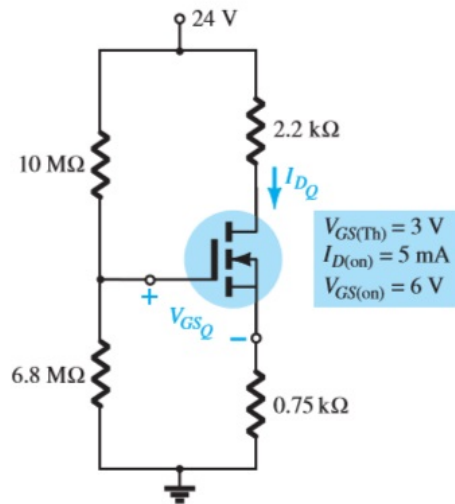
f)  $V_{DS} = \dots\dots\dots$





11. For the voltage-divider configuration of Figure, determine:

**\*\*Please show clearly methods and circle your answers with pen, then write your answer in the provided (red) box.**



a)  $I_{D_Q} = \dots\dots\dots$

b)  $V_{GS_Q} = \dots\dots\dots$

c)  $V_D = \dots\dots\dots$

d)  $V_S = \dots\dots\dots$

12. Design a network such as appears in Figure using an enhancement-type MOSFET with  $V_{GS(TH)} = 4\text{ V}$  and  $k = 0.5 \times 10^{-3}\text{ A/V}^2$  to have a Q-point of  $I_{D_Q} = 6\text{ mA}$ . Use a supply of 16 V and standard values.

