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ECE 0257 Quiz #5 Reflection

You should have received an email containing a link to your submission for quiz #2.

Instructions

- **Briefly review your quiz**
- **Use SPICE to model and simulate the problem**
- **Based on the simulation results, re-examine / re-solve the problem and try to identify where you made a mistake, gaps in your knowledge or new insights you gain from simulating the problem**
- **Fill out the worksheet on the following pages.**

Grading

- **50% of your overall score for this quiz will be determined by your original in-class performance**
- **The remaining 50% of your score will be determined by the responses you submit on this worksheet**

PLEASE NOTE: This quiz problem contained very specific MOSFET parameters (V_t = 0.5V, k'=100 uA/V^2, W=10um, L=1um). Thus, some extra steps are needed in order to accurately model the circuit. We are going to use a generic MOSFET diode and modify the parameters to match the problem we were given.

In your schematic, open up the "Breakout" Library and place the "MbreakN3" component. This is the MOSFET.

To see/modify the diode parameters, right click on the component and select "Edit PSPICE Model"

We need to make several modifications to the generic MOSFET model in order for it to match the problem you were given:

- **We need to set the threshold voltage to match (VTO)**
- **KP is the same as $u_n C_{ox}$**
- **W and L specify the size of the transistor (width and length)**

After making these modifications to the MOSFET, the model should read as follows

```
.model Mbreakn NMOS VTO=.5 KP=100u W=10u L=1u
```

Save the model, reconstruct the circuit and use it to reevaluate your work.

Final Answers

Problem #1

$8.8 * 10^{-4}$ A

Problem #2

0 A

*One way to simulate these problems is to perform a DC bias point analysis. If it appears that the voltage/current annotations are not updating after running simulation experiments, then close your schematic, re-open it and toggle the voltage/current markers (and) off and then back on. Alternatively, solutions can also be explored via transient and DC analyses**. In many instances, this proves to be more reliable.**

*Note, there may be slight differences between your final responses and numerical values that you determined via simulation. The final responses indicated above should represent results from <u>hand</u> calculations.

Being able to analyze your quiz and reflect on your thinking process is an essential part of learning.

- **If the answers you entered above are different in any way from the answers you provided on your original quiz submission, then please provide an explanation by answering the questions on the following page**

- **If re-examining the quiz did not result in you gaining new insights about the problem, identifying mistakes, or gaps in your knowledge then enter n/a in the boxes below.**

Explain the source of any differences between your quiz responses or calculations and the simulated results.

I did not realize when taking the quiz that the source terminal was connected to the gate. We have encountered problems where the drain is connected to the gate, and I am familiar with the process to solve those, so I somewhat recklessly assumed that that was the type of problem we would be working on for the quiz.

How can you use this comparison experience to improve in the future?

Now I'm more aware of an additional layer of complexity that can be applied in these problems - how the problem differs if the drain and source terminals are switched.