ECE 542
Homework #10

Due: Apr 6, 2020

1. You are working at a fabless company, and need to find a foundry to make 1,000 chips. This is a small production run. You talk to two potential vendors.

   Vendor A says that they are using a slightly older, more mature, technology on 200 mm diameter wafers, with a defect density of only 0.2 cm^{-2}. You estimate you will need 1 cm^2 of area to make a single die using their process. The photomask cost (one-time cost) is $100,000. The cost per wafer is $3,000.

   Vendor B is using a newer process (1 generation newer) with 300 mm diameter wafers. The feature size for Vendor B is 0.7x the feature size for Vendor A, so each die takes up ½ the area. However, their defect density is 0.4 cm^{-2} (2x higher), the wafer cost is $6,000 (2x higher), and the photomask cost is 2x higher ($200,000).

   A) Fill in the following table.

	Vendor A	Vendor B
Photomask cost		
Wafer diameter		
Wafer cost		
Defect density		
Chip Area		
# chips / wafer		
Yield		
# good chips / wafer (round down)		
# wafers required		
Total run cost (wafers + photomask)		
Cost per chip (Total run cost / 1,000 chips)		

   B) Which vendor would you choose for the initial run?

2. You change jobs, and are now working for a company that makes chips for a big market. You will need to produce 1,000,000 chips per year. All the other parameters remain the same (same vendors, same chip size).

   Make a new table for making 1,000,000 chips. What is the cost per chip for each vendor? Which vendor would you choose to produce the 1,000,000 chips?