Problem 1. Draw diagrams for $S^3 \times S^1$ and $S^2 \tilde{\times} S^2$.

Problem 2. What is $D(\natural_m S^k \times D^{n-k})$? What is $D(X \natural Y)$?

Problem 3. Draw a Kirby diagram for a closed manifold $X$ with:
(i) $\pi_1(X) = \langle a | a^n = 1 \rangle$
(ii) $\pi_1(X) = \langle a, b | aba = 1 \rangle$
(iii) Some fixed group with finite presentation.
Hints: Draw the 2-handlebody $Y$, then define $X = DY$. Why don’t the new 2-handles change $\pi_1$?