Steps for Resin Printing

1. Design the mold of the desired pattern in a CAD software, or use one of the molds provided in the Bender et al. Microfabrication GitHub repository. Some tips and troubleshooting tricks are provided below:
    a. Design the mold such that the file is a negative of the desired pattern to ensure the stamp is raised at the correct locations
    b. Design the walls surrounding the pattern so that there are walls on only 2 of the 4 sides. This will allow for easy PDMS removal after the curing process. Tape can be used to form temporary walls when pouring in the liquid PDMS.
    c. Hollow out the base of the mold. Resin printing does not automatically hollow out solid masses like other forms of 3D printing, and solid objects can consume large amounts of resin. Manually hollowing out the base allows one to save on materials
    d. In the molds used by Bender et al., the pattern depth is extruded 300μm, which helps ensure that the pattern is clear but not so fragile that it breaks during the removal process
2. Export the CAD model as an STL and import it into the proper slicing software for the resin printer of choice.
    a. The printer with the highest possible resolution should be used for the best results of the pattern.
3. Slice the model according to the printer's specifications. Some helpful tips concerning slicing:
    a. Select the smallest possible layer height
    b. Some slicing softwares, such as PreForm, have automatic slicing options. While these options can be helpful, they will often print the file at an angle to help with adhesion issues. This has the unintended consequence of visible layer lines in the print, which can then transfer to the PDMS stamp, leading to uneven micropatterns. To avoid this, manually change the orientation of the file to print on one of the flat surfaces and ensure a smooth top surface
4. Remove the completed print gently, remove supports, and wash off excess resin via an IPA bath prior to the curing process.
5. Some common issues for subpar prints and suggested troubleshooting mechanisms/other factors to consider are listed below:

a. Expired resin: Depending on the type and quality of resin being used, subpar prints may be due to old/bad resin. Resin typically should be used within a year of purchasing and within six months of opening the resin cartridge
b. Textured surface: A textured top surface may be due to visible layer lines (mentioned previously) or the presence of supports on the pattern surface that leave behind noticeable marks upon removal. Visible layer lines can be addressed by rotating the model to lie flat on the printing surface, ensuring a smooth top surface. To remove specific supports, standard slicing softwares come with support blockers, allowing the user to target specific supports for removal.