Homework Template
Due XX

Be sure to show all your work for credit. You must turn in your code as well as output files (**code attached at the end of the report**).

Please generate a report that contains the code and output in a single readable format using Latex.

1. Code and Images

   (a) Include nicely formatted code using `lstlistings`.

   (b) Include images into your report. Plotting images side-by-side in a 2×2 subplot matrix.

   Solution

   (a) Matlab code can be entered as in the following. Copy your code directly into the `lstlisting` environment. You may not need to indicate Matlab as the language depending on your system setup.

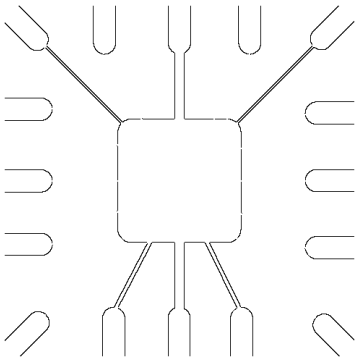
```
% name_of_file_function.m
s = load('TIMIT.ASC');
x = s/max(s) + 0.02*randn(size(s));

scale = 8;
fs = 8000;
win = 2^scale;
alphas = 1/2^(scale-4);
alphal = 1/2^(scale-1);
betal = 5;

%fft params
N = round(length(x)/win);
delf = fs/win;
K1 = find(delf*(0:N-1)>=300,1);
K2 = find(delf*(0:N-1)>1000,1)-1;
```

   (b) This problem requires you to generate a 2×2 subplot. This can be done in Matlab directly (include a single image) or create four output images and organize in Latex. The advantage of the second is the ability to sub reference plots.

   Below is a quick way to include an image. This does not give a lot of control on placement on the page. In general, Latex can be a little funny about image placement so don't expect it to work as well as Word.



More often I would suggest to include the image within a Figure environment in order to isolate it as a "float" element and to have captions and labels for referencing. An example is below in Fig. 1

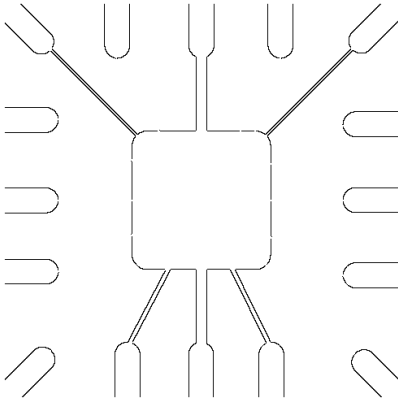


Figure 1: Example of a floating figure environment where the optional parameters controls placement. [!htp] indicates trying to force a placement here in the page while t and b are for top and bottom of a page

Another example of a Figure with multiple images is shown in Fig. 2

Finally, you can use `subcaption` to have labels and references to parts of a multi image which is the most flexible option as shown in Figure 3.

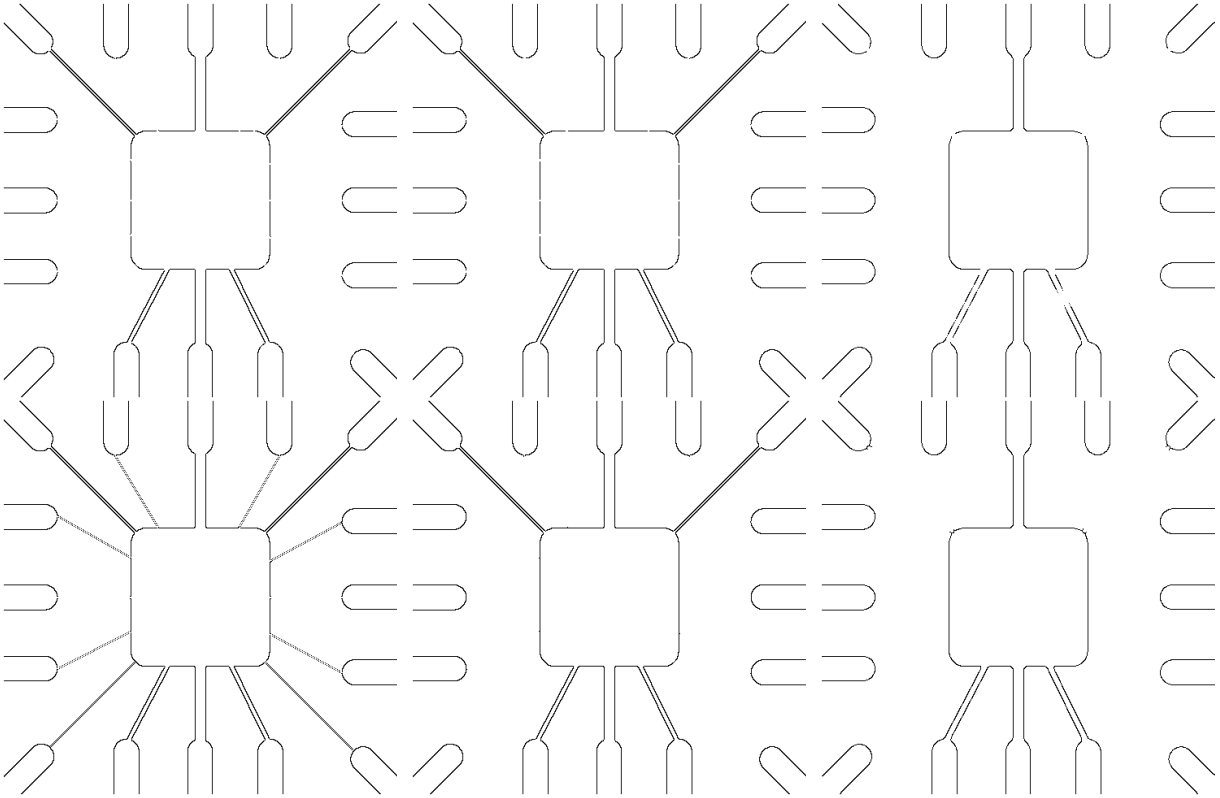
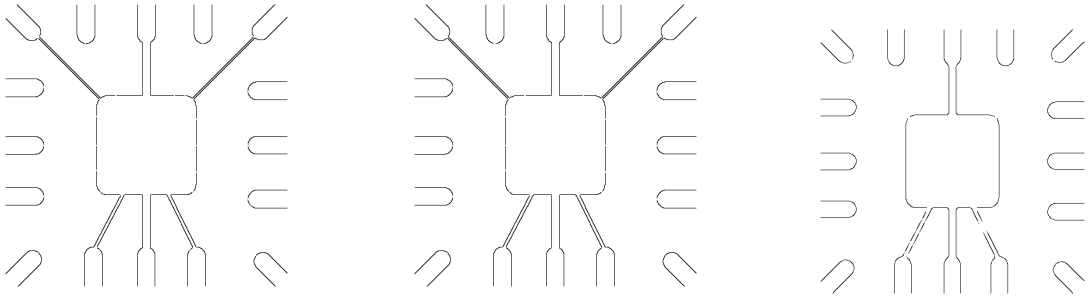


Figure 2: Top Row: $\tau = 0.8$ and $\sigma = \{0.5, 1.0, 3.0\}$ Bottom Row: $\tau = 0.6$ and $\sigma = \{0.5, 1.0, 3.0\}$



(a) Wire01 (b) Wire02 (c) Wire03

Figure 3: Example of image with subfigures. (a) You can get just the letter with `\subref`. Notice this version does not use the viewport option which is useful when inserting a pdf to remove whitespace (you can view cursor coordinates in Acrobat and other pdf viewers). Alternatively, you can crop or trim the white space of the pdf.

2. Latex Table

   (a) Compile results using a Latex Table.

Solution

Here is an example of a Latex Table (Table 1). Note: the caption typically goes above the Table in our publications. I highly recommend building it either directly in an online table generator (e.g. website) or building in Excel and copying into the table generator. Once you get the hang of it you can probably build directly in Latex. And if you want to be really clever, you can setup your Matlab script to format and generate the table for you.

Table 1: An example Table with caption on top

head1	head1	head3
1	2	3
4	5	6