Time to Match Some Things

1 Fun with Equations!

Some more goodies from random parts of my dissertation:

$$h(t) \equiv \lim_{\delta_1,\delta_2 \to 0^+} \delta_2^{-1} \mathrm{pr}\left\{N(t, t+\delta_2) > 0 | N(-\delta_1, 0) > 0\right\} \tag{1}$$

Here's another goodie....

$$\mathrm{var}[N(t)] = \mathrm{var}\left\{\sum_{i=1}^{t/\delta} N((i-1)\delta, i\delta]\right\} \tag{2}$$

Here's one from the last paper I authored.

$$\left[\frac{\mathrm{var}[N(t)]}{\overline{[N(t)]}}\right]_m = 3 - 4\lambda_m\tau - 2\exp\left(\frac{-\lambda_m\tau}{1-\lambda_m\tau}\right) + \\ + \frac{1}{t}\left[4\lambda_m\tau^2 - \frac{2}{\lambda_m} + \exp\left(\frac{-\lambda_m\tau}{1-\lambda_m\tau}\right)\left(2\tau + \frac{2}{\lambda_m}\right)\right] \tag{3}$$

Finally, one that I didn't use in my dissertation, but those of you who are interested in computers and quantum mechanics are probably going to run into....the Hartree-Fock equation:

$$\left[-\frac{\hbar^2}{2m}\nabla_i^2 + V_{\mathrm{ext}} + V_{\mathrm{sp}}(\mathbf{r}_i)\right]\phi_i(\mathbf{r}_i) - \sum_j \int \frac{e^2}{|\mathbf{r}-\mathbf{r}'|}\phi_j^*(\mathbf{r}')\phi_i(\mathbf{r}')\phi_j(\mathbf{r})\delta_{si}\delta_{sj}\mathrm{d}r' = \epsilon_i\phi_i(\mathbf{r}_i) \tag{4}$$

2 Fun with Tables!

Here are two tables from the same paper as the above formula. (As a hint – use the tabular environment). Another hint – all three columns are left-aligned.

Dead Time Applied	λ_{inv}	$\left[\frac{\text{var}}{\text{mean}}\right]_{\text{inv}}$
None	1.0000	1.0000
Non-extensible	1.0002	1.0123
Extensible	1.0155	1.0121

Here's another one from the same paper, formatted a little differently. Note that the below table uses both the table command and the tabular environment. (Hence the caption). Above, we use only the tabular environment.

Table 1: Attempts at inversion for the Matérn cluster process. An ideal inversion would have $\lambda = 1$ and var/mean = 3. The inversions without an asterisk correspond to the values obtained when using the Poisson inversion algorithm developed in an earlier section, while the asterisked columns correspond to the modified inversions described immediately above.

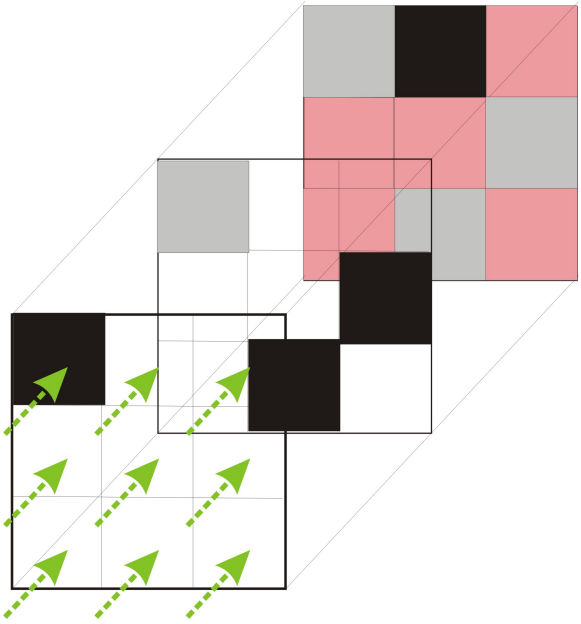
Dead Time Applied	λ_{inv}	$(\lambda_{\text{inv}})^*$	$[\text{var/mean}]_{\text{inv}}$	$[\text{var/mean}]^*_{\text{inv}}$
None	0.9974	0.9974	2.9197	2.9197
Non-extensible	0.7956	1.0089	1.9112	2.8466
Extensible	0.7497	0.9029	1.7432	2.7568

(As a hint for the above, the commands are `\Radioactivity`, `\Faxmachine`, and `\HERMAPHRODITE`. You'll have to figure out what packages you need to load in order to use them, however. (Check the comprehensive symbol list). In this paragraph, I am able to write the commands for the symbols without them showing up again by using verbatim. I also used the Huge command when making the symbols.)

3 On to figures!

First off, you're going to have to go get the figures to put in here. Because I'm mean, they're on Dr. Price's server. You will need to ftp in and get them; they can be found in `/Public/figsforhw4/` (You remember your login and password, right?)

First, let's put in a picture, but not in figure mode. (No caption, or figure number, or anything). Center it, and set its width to 3 in. We'll use `bust.jpg` for this one. (Note that for filenames, I'm using the verbatim command.)



3.1 Figure with a caption!

Here's another one. This time with a caption. (Filename is `fractal_clouds.jpg`, width is 5in, image is centered).

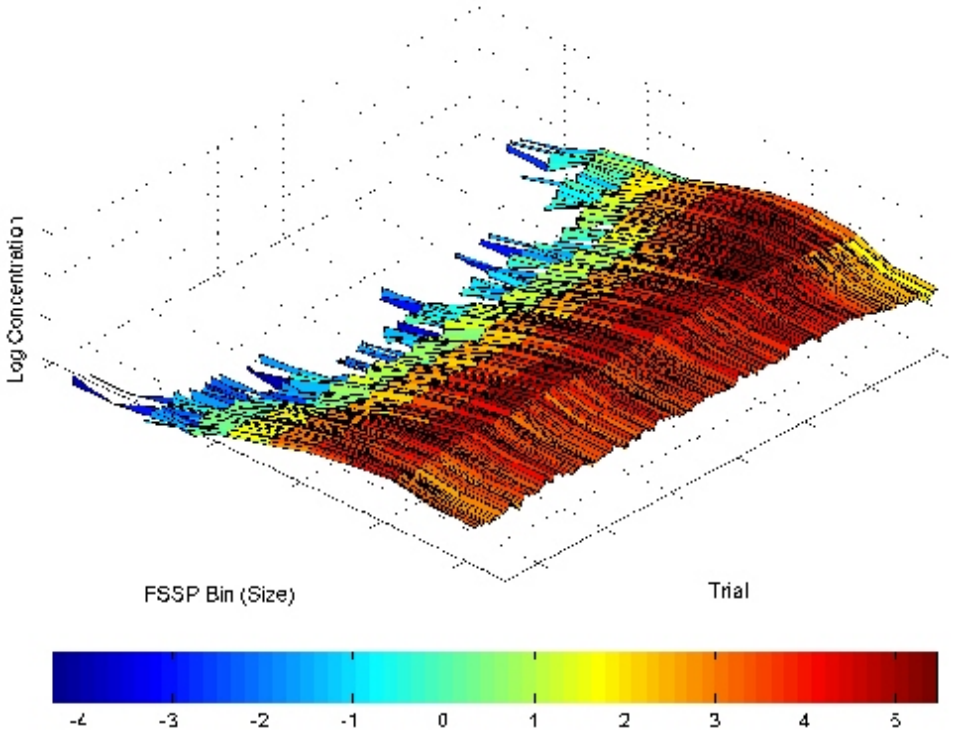
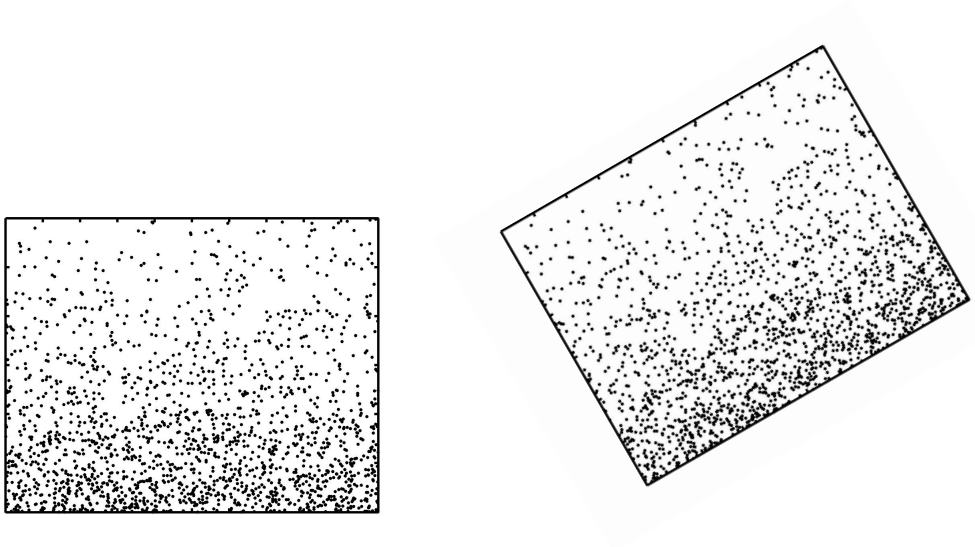


Figure 1: This is a caption for a figure

3.2 Subfigures and Rotation!

Now we'll do something a little bit different. We're going to manually make subfigures, and the second one we'll rotate. Make sure to include the "subfigure" package in your preamble. Both images have a width of 2.5 inches. The figure used is `inhom.jpg`.

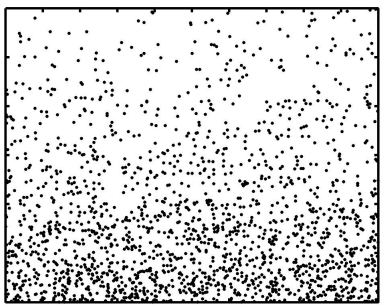


(a) Original Image

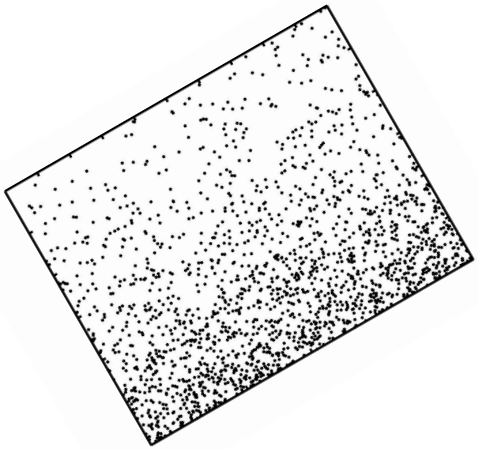
(b) Rotated through 30 degrees

Figure 2: Same figure – original and rotated

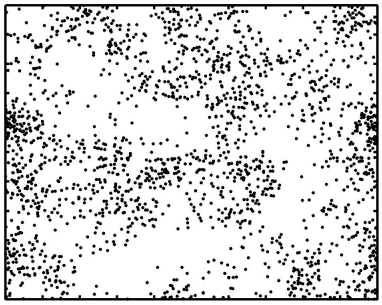
Time for more subfigures, but this time we'll have three. Same as the previous page, but the third figure is `clustered.jpg`. (Same size as the others).



(a) Original Image



(b) Rotated through 30 degrees



(c) Different Image

Figure 3: Three panel figure!

4 Embedded Bibliographies

As Dr. Larsen has (or will) mention in class, there are two primary ways to handle references/bibliographies in LaTeX. One of these, BibTeX, will be discussed later. For now, we will give you a little work on what are called in-line bibliographies. Typically you use these if you just have a few references or don't want to deal with all the intricacies of BibTeX. I am going to check your raw .tex files to make sure you are citing [3] and [7] with the correct use of the `\cite` function. (By the way, for the curious, these are real papers written by your instructors in this department. I took the most recent first-author (when possible) article for each that I was able to find with Web of Science (a great tool you should use at some point).)

References

[1] E. Bohm-Vitense, R. Robinson, K. Carpenter, and J. Mena-Werth (2002). What is happening at spectral type F5 in Hyades F stars? *Astrophysical Journal*, **569**(2), 941-963.

[2] M.L. Larsen and A.B. Kostinski (2009). Simple dead-time corrections for discrete time series of non-Poisson data. *Measurement Science and Technology*, **20**(9), 095101.

[3] M.E. Markes and P.F. Williams (2003). The effect of plasma shielding on dust particle interaction in low pressure plasmas. *Physics of Plasmas* **10**(4), 1152-1158.

[4] T. Markes (2010). Strength of student models in force and motion. APS March Meeting 2010. March 15-19, 2010. Portland, OR. `http://meetings.aps.org/Meeting/MAR10/SessionIndex3/?SessionEventID=125369`

[5] O. Pishnyak, A. Golovin, L. Kreminska, J.J. Pouch, F.A. Miranda, B.K. Winker, and O.D. Lavrentovich (2006). Smectic-A-filled birefringent elements and fast switching twisted dual-frequency nematic cells used for digital light deflection. *Optical Engineering* **45**(4), 044002.

[6] R.I. Price (1995). Whither the infobahn. *Scientific American* **272**(5), 8.

[7] K.W. Trantham, M. Jacka, A.R.P. Rau, and S.J. Buckman (1999). The structure of triply excited, negative-ion resonances in the autoionizing region of Helium. *Journal of Physics B – Atomic, Molecular, and Optical Physics* **32**(3), 815-824.