

1. Based on the attached Excel spreadsheet containing US and world oil production rate figures for the last hundred years or so, fit the distribution

$$q(t) = \frac{Q_\infty}{\sigma\sqrt{2\pi}} \exp\left(-\frac{1}{2} \left(\frac{t - \mu}{\sigma}\right)^2\right)$$

to the oil production rate data. In the expression, Q_∞ is the total amount of oil produced, μ is date of the maximum rate of oil production, and σ is the characteristic width of the distribution.

- (a) Using US oil production figures, determine the values of Q_∞ , μ and σ . Based on your calculations, when will we stop producing oil in the US? To quantify this, look for the date when we fall below 5% of our maximum production.
- (b) Using world oil production figures, determine the values of Q_∞ , μ and σ . Based on your calculations, when will we stop producing oil in the world? To quantify this, look for the date when we fall below 5% of the maximum production.
- (c) Using world oil production figures, determine the values of μ and σ assuming
 - a modest estimate of $Q_\infty = 2$ trillion barrels
 - $Q_\infty = 3$ trillion barrels
 - a generous estimate of $Q_\infty = 4$ trillion barrels

For each of these cases, when will the world oil production rate peak, and when will we “run out of oil?”

For each of the above calculations, plot your results on an appropriate graph and indicate key events (you may do this by hand if you need to), such as the date of maximum production and the date when we essentially stop producing oil. Be sure to include labels on your plots.

Please observe the following general guidelines for homework submission. Your homework should:

- have all MatLab files placed in a directory (folder) called YourNameHW11 which is zipped into a file called YourNamePR03.zip and emailed to adam@colorado.edu by 11:59 PM on the due date.
- all m-files should contain the following lines at the beginning, (with the appropriate information filled in):

```
% Your Name  
% Project 03  
% APPM 3050  
% Date: today's date
```

- all m-files should contain comments to clearly explain what is being done at various points in the program.
- all m-files should clearly list and explain the input and output from any function files.
- any hard-copy should contain a clear statement of the problem, in your own words.
- any hard-copy should contain a clear discussion of the results of the problem. (Do the results make sense? Are they reasonable? Why, or why not? Do you *trust* the results of your program?)