Quantitative Researcher Assessment Process Guidance

Imagine beating the efficient market hypothesis with the full big data toolset.

Congratulations on being invited to interview with G-Research! Our assessment process has been designed to require little preparation. However we often get asked by candidates where they should "brush-up" before meeting us so we've put together a few suggestions. We advise preparing for a maximum of two weeks for our first round as we'll provide feedback for future rounds if required.

Quant Finance

It would be helpful to be familiar with some basic financial concepts such as: The Black Scholes equation, Sharpe ratio, portfolio optimisation, CAPM, time series analysis, PDEs, convex optimisation, securities markets 101, pairs trading strategies, trend following and mean reversion strategies, market microstructure, & Monte Carlo methods.

Mark Joshi's simple guide to becoming a Quant is free to download and - we fall under the "Statistical Arbitrage" section. Mark's website is quite informative in general.

If you would like to explore further, the first 3-4 chapters of the textbook Active Portfolio Managmement by Grinold & Kahn is a good starting point:

Grinold and Kahn, Active Portfolio Management : A quantitative approach for producing superior returns and selecting superior money managers http://www.amazon.co.uk/dp/0070248826

We'd generally advise - once you have a grounding in the theory - maybe thinking about an example trading strategy and what kinds of data could be interesting to develop this.

Stats & probabilities

For the purposes of our early interview process, 1st and 2nd year undergraduate probability and statistics is sufficient. Please see below the course synopsis for these at University of Oxford and MIT, which contain a good overview. There also might also be useful exercise sheets and lecture notes on these pages.

1st year:
Probability: https://courses.maths.ox.ac.uk/node/5610
Statistics: https://courses.maths.ox.ac.uk/node/5623

2nd year:
Probability: https://courses.maths.ox.ac.uk/node/5443
Statistics: https://courses.maths.ox.ac.uk/node/5449

Introduction to probability & statistics:

https://ocw.mit.edu/courses/mathematics/18-05-introduction-to-probability-and-statistics-spring-2014/

Maths of Data Science:

https://ocw.mit.edu/courses/mathematics/18-s096-topics-in-mathematics-of-data-science-fall-2015/

Coding

From our perspective, practice is preferable to theory. There's a site called ProjectEuler.net, which provides some bite-size maths problems that often require a computational solution; this might be a nice place to start. There are also Codility, Kaggle & TopCoder that have similar projects. Once you have some practice under your belt, Kaggle gives you the opportunity to work with real data sets in a way that is closer to what we do.

Another thing you could try is implementing a "simple" statistical method of your choice. Find a dataset of your choice (any dataset, really), and try to compute some statistics on it using an OO language. Again, this will allow you to use your developing skills in the ways that we use them.

Below are a couple of examples of something that might be asked at the interview stage. Have a go at these and maybe find some similar problems and this will put you in a good position when you come in to meet us.

The 8 Queens Problem:

You have to put 8 queens on a chess board where they can't take each other.
Then generalise by using any type of piece or by having n pieces on and n x n board.
How many solutions exist? Print them out.

Matrix:

Write a simple matrix class that can do multiplication. Override some operators for + and *.