MAU11S02 sixth Friday quiz, week 8
Friday 26/3/21 due 1pm Friday 2/4/21

Rules and procedures.
1. Attempt 3 questions. Only *your first three answers* will be marked. **2.** Each question carries 20 marks, so the maximum quiz mark is 60. **3.** If a particular method of solution is stipulated, you get no marks if you don't use it. **4.** ***Show all work.*** No marks will be given for answers which do not show the calculations. **5.** Your answers should be scanned and submitted to Blackboard as a 'Monday assignment.'

Remember, you must show all work.

Question 1. Calculate the least-squares linear estimate $y = mx + c$ for the data

$$(-3, 0),\ (-1, 1),\ (0, 2),\ (1, 2)$$

Question 2. Calculate the least-squares quadratic estimate $y = ax^2 + bx + c$ for

$$(-3, 0),\ (-1, 1),\ (0, 2),\ (1, 2)$$

same data as in Question 1.

Question 3. Let

$$A = \begin{bmatrix} 12 & -10 \\ 15 & -13 \end{bmatrix}$$

Calculate eigenvalues and eigenvectors for A.

Question 4. Hence express A in the form $SA'S^{-1}$ where A' is a diagonal matrix, and evaluate e^A.

Question 5. Use eigenvector methods to calculate

$$\arctan \begin{bmatrix} 0 & 1/3 \\ 1 & 0 \end{bmatrix}$$

Note: $\tan(\pi/6) = 1/\sqrt{3}$. It should not be necessary to know a power series expansion for $\arctan(x)$, but here it is: $x - x^3/3 + x^5/5 \ldots$ converges to $\arctan(x)$ — $\tan^{-1}(x)$ — if $|x| < 1$. The calculations are rather different this time. Sorry.