Warmup Questions for the Final

1. (a) True/False: MATLAB is case-sensitive

True

(b) How are comments added in MATLAB code?

With percent sign

(c) True/False: every if must have an else

False

(d) What does \texttt{length(2021:2020)} evaluate to?

0

(e) If I have vectors \texttt{A} and \texttt{B}, how do I produce a vector that is their concatenation?

For example \texttt{[A B ]}

(f) True/False: A function does not have to return a value.

True

(g) True/False: random numbers can be generated by both the \texttt{rand} and \texttt{irand} commands.

False: the latter is \texttt{randi}

(h) I have a number stored in variable \texttt{X}. Give code to print it out to 2 decimal places.

\texttt{fprintf("%.2f", X );}

2. Consider a simultaneous game with two players, Matcher and Avoider. They both pick a letter from A upto Z. If their letters are different, nothing happens. If they match, then the Avoider pays the Matcher one dollar. Determine the optimal strategy for the Matcher and the Avoider, and the value of the game. Justify your answer.

By symmetry, each player should randomly pick a letter with each letter equally likely. The value is $\frac{1}{26}$.
3. In a quiz-show, the object is to determine a 5-letter word. A contestant repeatedly
guesses a 5-letter word and receives an integer equivalent to the Black score in Master-
mind (that is, how many of the letters are correct and in the correct position). Suppose
the entire dictionary contains the eight words \{ CATCH, CATER, CATTY, CONIC, MATES,
MATER, MINCE, MAJOR \}

(a) Calculate the entropy for CATCH as the first guess.

The initial response is: 5 for CATCH; 3 for CATER, CATTY;
2 for MATES, MATER; 1 for CONIC, MINCE, MAJOR. So
proportions are $\frac{1}{8}$; $\frac{1}{4}$; $\frac{1}{4}$; $\frac{3}{8}$. Entropy is $\frac{11}{8} - \frac{3}{8} \log_2 \frac{3}{8} \approx 1.9056$

(b) Draw an optimal decision tree, assuming the first word is CATCH and we are trying
to minimize the average number of guesses needed.

If response 3, guess either CATER, CATTY
If response 2, guess either MATES, MATER
If response 1, guess MAJOR or CONIC (but not MINCE)

4. Code reading: See several of the CanvasQuizzes.