

# MAT 120 Homework 6

## Fall 2024

Due date: Wednesday, Nov 27

1. Find the correct number:

- (a) The number of lists (permutations) of three symbols taken from the set  $\{a, b, c, d, e\}$ .
- (b) The number of subsets of  $\{a, b, c, d, e\}$  of size 3.
- (c) The number of pairs of notes taken from one equal-tempered octave: A220 through A440.
- (d) The number of different five-note melodies take from the first five notes of a chromatic scale if no note is repeated.
- (e) The number of different five-note melodies take from the first five notes of a chromatic scale if notes can be repeated.
- (f) The number of different five-note melodies take from the first five notes of a chromatic scale if notes can be repeated at most three times.
- (g) The number of major triads, or inversions of major triads, that can be played from one equal-tempered octave: A220 through A440. (Note: Not all inversions of triads will still fit into that octave. Inversions of a triad like CEG are just EGC and GCE.)

2. Find the correct probability:

- (a) The probability that the sum is at most ten when two fair dice are rolled.
- (b) The probability that the difference (high minus low) is at most three when two fair dice are rolled.
- (c) The probability that the two numbers have opposite parity (one odd one even) when two fair dice are rolled.
- (d) The probability that in two tosses of a fair coin there are no heads.
- (e) The probability that in three tosses of a fair coin there are at most two heads.
- (f) The probability that a three note melody taken from the first five notes of a major scale starting at C is exactly E D C, if repetitions are not allowed.
- (g) The probability that a three note melody taken from the first five notes of a major scale starting at C is exactly E D C, if repetitions *are* allowed.
- (h) The probability that a seven note melody taken from the first three notes of a major scale starting at C is exactly E D C D E E E, if repetitions *are* allowed.