MTH 225 Weekly Practice 7 Due: 11:59pm ET Sunday, October 25, 2020

Directions:

- Complete the exercises below and either write up or type up your solutions. Solutions must be submitted as PDF or Word documents, uploaded to the appropriate assignment area on Blackboard.
- If you choose to submit handwritten work, it must be neat and legible; if you do your handwritten work on paper, it must be **scanned to a PDF file** and submitted to Blackboard. Instructions and practice for scanning work to PDFs is given in the Startup Assignment. **Do not just take a picture**, **and do not submit a graphics file (JPG**, **PNG**, **etc.)** — such submissions will not be graded.
- Work that would receive a grade of "M" on the EMRN rubric will be given 10 engagement credits, and work that would ordinarily receive a grade of "R" will be given 5 engagement credits. No revisions will be allowed, but a key will be posted after the deadline passes.
- Every item must have a good-faith effort at a complete and correct response. If any item is left blank, or shows minimal effort (such as answering "I don't know"), or is significantly incomplete, the entire assignment will be graded at 0 engagement credits.

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1. There are four major auto routes from Boston to Detroit and six from Detroit to Los Angeles. How many major auto routes are there from Boston to Los Angeles via Detroit?
2. A *palindrome* is a string whose reversal is identical to the string — i.e. it's spelled the same forwards and backwards. Examples include "kayak", "noon", "rotator", and "xyzzyx" (the last one illustrates that palindromes are just strings, they don't have to be actual words). How many strings of palindromes of length n are there, if we use only lowercase English letters and no punctuation or spaces? (Start by thinking about how palindromes there are of length 2, of length 3, of length 4, etc.)
3. A particular brand of shirt comes in 12 colors, has a version for men and a version for women, and comes in three sizes for each gender. How many different types of this shirt are there?
4. How many 16-bit strings are there:
   (a) In all?
   (b) Whose bits add up to 5?
   (c) Whose bits add up to 11?
   (d) That end in 00?
   (e) That end in 00 or begin with 11?
   (f) That end in 00 and whose bits add up to 15?
   (g) That end in 00 and whose bits add up to 4?

   Make your reasoning clear on each of these.