CS 170 Midterm 1 Common Mistakes

Question 1

Part a

- So many L'Hopital
- Coming up with divide-and-conquer algorithms with recurrence relations as T(n) = 2*T(n/2) + O(n)

Part e

- Many students assumed the M-path in G was the same M-path in the MST and justified a false answer off of that

Question 2

- Saying that n is divided by 4 instead of by 2
- Saying the time it takes to piece together the subproblems is O(n)
- Divides into four squares but does not explain how to recurse on subtrays that have no burnt square or presents a tiling for subtrays with no burnt square that does not work
- Presents an attempt at the alternate solution but doesn't explain how to tile the L shaped portions
- Presents a "rotating" solution that is used to solve the non burnt areas that has the wrong runtime
- Blindly saying divide and conquer algorithms run in O(nlogn)

Question 3

- Lots of people simply neglected any discussion of sorting the edges

Question 4

Part a

- You can't just replace multiplication in cross correlation with XOR's since cross correlation is O(nlogn) using FFT specifically because we are using multiplication.
- Attempting to use huffman encoding
- Flipping each bit in P then doing cross correlation and taking the indices where the dot product is zero doesn't work. Take the following counter example. T = 0000 P = 11

Part b

Part c

Part d

- Answers involving huffman encoding are too slow, for the encoding for each character will depend on “s” (the size of the alphabet). Consider the case where the number of characters in P and T are uniformly distributed, then each character will be encoded with a length log(s) bitstring. Thus, running cross correlation will take O((nlogs)(log(nlogs))).

Part e