Joshua Burkhart
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BMI 650

Homework 4

Q1) For the following sequence: ACTGCTCGGCT

A) Compute the suffix array for this sequence

```
def suffix_array(instring):
   instring += S_TERM
   sa = []
   [sa.append(instring[x:]) for x in range(len(instring))]
   return sorted(sa)
```

```
Suffix Array
------------
$
ACTGCTCGGCT$
CGGCT$
CT$
CTCGGCT$
CTGCTCGGCT$
GCT$
GCTCGGCT$
GGCT$
T$
TCGGCT$
TGCTCGGCT$
```

B) Compute the Burrows Wheeler Transform for this sequence (show the BW Matrix)

```
def circular_suffix_array(instring):
   instring += S_TERM
   sa = []
   [sa.append(instring[x:] + instring[:x]) for x in range(len(instring))]
   return sorted(sa)
```

```
BW Matrix
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$ACTGCTCGGCT
ACTGCTCGGCT$
CGGCT$ACTGCT
CT$ACTGCTCGG
CTCGGCT$ACTG
CTGCTCGGCT$A
GCT$ACTGCTCG
GCTCGGCT$ACT
GGCT$ACTGCTC
T$ACTGCTCGGC
TCGGCT$ACTGC
TGCTCGGCT$AC
```
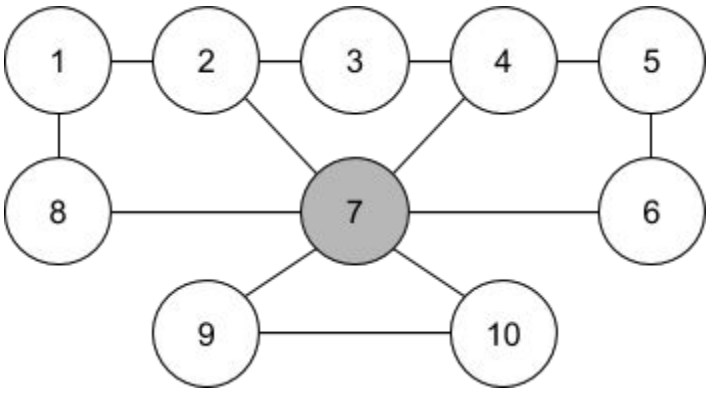

Q2) Does this graph have a Hamiltonian Cycle? Why or why not?



No. The (7,9,10) subgraph is connected to the (1,2,3,4,5,6,7,8) subgraph through a single vertex, 7, and cannot be entered and exited without reusing it for traversal. Because of this necessary reuse, a Hamiltonian cycle cannot exist.