Module 10

10.1 615 miles

10.2 $\frac{(n-1)!}{2}$ because you chose any first city and account for the reverse

10.3 123, 1-2-3, 12-3, 13-2, 23-1

10.4

10.5
a. Alg1 0, 01, 012, 0123. Alg2 0, 02, 021, 0213
b. Algorithm1: $O(n-1)$
c. Algorithm2: $O\frac{(n-1)!}{2}$

10.6 #1 is a polynomial, 2 is a polynomial, 4 is not, 5 and 6 both are.

10.7 #1 is because it meets all the conditions, 2 is not because there aren't different states and no cost. 3 is not because they a finite state space. And 4 is a combinational optimization

10.8
A1 If we create one tour t0. We flip a coin to determine if a given tour has less cost than our best tour or not. Heads means yes. tails is no.

minTour = S_0 $\xRightarrow{S_1}$ minTour = S_0 $\xRightarrow{\text{tails}}$ minTour = S_0

$S = S_0$ $S = S_1$ $S = S_2$

$\xRightarrow{\text{Heads}}$ minTour = S_2 $\xRightarrow{S_3}$ minTour = S_2

$S = S_2$ $S = S_3$

A2 there, we would still use the coin to randomize a tour but we also roll a die to decide which two points

minTour = S_0 $\xrightarrow[(1,2)]{S_1}$ minTour = S_0 $\xrightarrow{\text{heads}}$ minTour = S_1

$S = S_0$ $\qquad$ $S = S_1$ $\qquad$ $S = S_1$

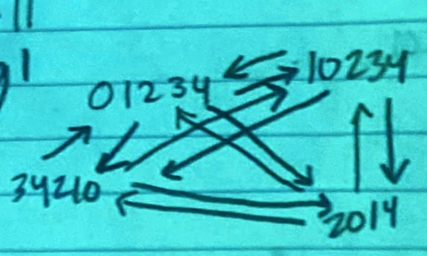
$\xrightarrow[(3,4)]{S_2}$ minTour = S_1 $\xrightarrow{\text{tails}}$ minTour = S_1

$S = S_2$ $\qquad$ $S = S_2$

10.9 Alg 1 : $O(n-1)$
Alg 2: $O\frac{(n-1)!}{2}$

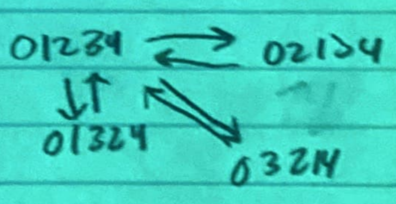
10.10 ~~nextState~~ (state s)
t = s
pick a random point in t
pick a number smaller than the first
Swap the numbers
return t

10.11
Alg 1



There are $(n-1)!$ States

Alg 2



There are $\frac{(n-1)!}{2}$ states

10.12 Alg 1: nextState (s)

b = generate random arrangment
return b

Alg 2: nextState(s)

b = s
Pick any random items in b
Swap
If one doesn't fit put in new bin
return b

10.14 $5^2 + 5^2 = 50$

$4^2 + 6^2 = 52$ $3^2 + 7^2 = 58$

10.15 as $T \rightarrow$ infinity $r \rightarrow 1$

as $T \rightarrow 0$ $r \rightarrow$ infinity