Math 1116 Homework #4 Key

1. a. Nearest Neighbor

Seattle - Honolulu - Cairo - London - Moscow - Seattle
   159   801   323   245   654

= 2182

b. part a +

Honolulu - Seattle - London - Moscow - Cairo - Honolulu
   159   370   245   392   801

= 1967

London - Moscow - Cairo - Seattle - Honolulu - London
   245   329   684   159   830

= 2247

Moscow - London - Cairo - Seattle - Honolulu - Moscow
   245   323   684   159   854

= 2265

Cairo - London - Moscow - Seattle - Honolulu - Cairo
  323   245   654   159   684

= 2065

Cheapest Starts in Honolulu: weight = 1967

c.

= 2182

1d. Brute force has 12 possible distinct circuits $\frac{(5-1)!}{2} = 12$

SHLMCS- 159+830+245+329+684 = 2247

SHLCMS- 159+830+323+329+654 = 2295

SHMLCS- 159+854+245+323+684 = 2265

SHMCLS- 159+854+329+323+370 = 2035

SHCMLS- 159+801+329+245+370 = 1904   ⟵ minimum

SHCLMS- 159+801+323+245+654 = 2182

SLHMCS- 370+830+854+329+684 = 3067

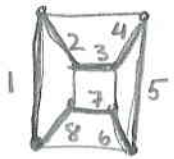SLHCMS- 370+830+801+329+654 = 2984

SLMHCS- 370+245+854+801+684 = 2954

SLCHMS- 370+323+801+854+654 = 3002

SMHLCS- 654+854+830+323+684 = 3345
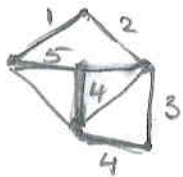
SMLHCS- 654+245+830+801+684 = 3214

2. a.

has a Hamilton circuit

b.

has a path, but not a circuit

c.

has a circuit

3.

n=2 has a Hamilton circuit

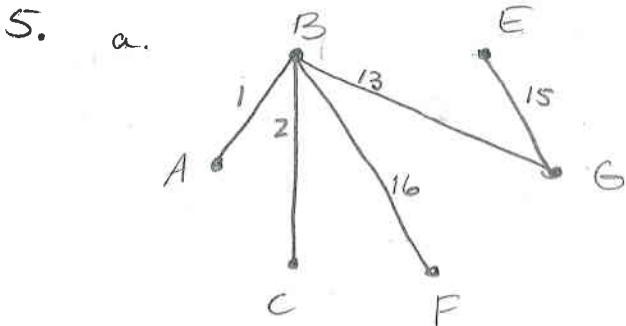n=3 has a Hamilton circuit

3 cont'd
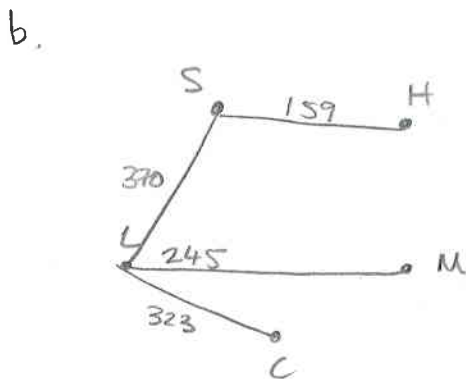
n=4 has a Hamilton circuit

all values of n appear to have at least one Hamilton circuit.

4. a.   b.   c.

5. a.

B
E

1   13   15

2

A   16   G

C   F

=47

b.

S   159   H

370

245   M

323

C

= 1097

6. a. Brute Force is inefficient (takes a lot of calculating) but is optimal (gives true minimum)

b. Nearest Neighbor is efficient (little calculation) but is approximate (does not guarantee true minimum)

c. Cheapest Link is efficient (little calculation) but is approx.

d. Kruskal's is both efficient and optimal.