Accelerated Pre-Calculus Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Unit 5

WS 10: Vertex Edge Graphs – Further Practice Date: \_\_\_\_\_\_\_\_\_\_\_ Block: \_\_

SHARING SECRETS

Within a small group of associates, different people are willing to share secrets selectively. Achyutan (A) will share with Elise (E). Brennan (B) will share with Caroline(C) and Achyutan. Caroline will share with Elise and David (D). David will share with Fiona (F) and Elise. Elise will share with Achyutan and Brennan. Fiona will share with Achuytan and Brennan.

1. Show this information with a digraph and an adjacency matrix named S.

A B C D E F

A

B

C

D

E

F

2. What do the zeros on the diagonal of the adjacency matrix indicate?

3. Find S2 and S3.

S2 S3

A B C D E F A B C D E F

A A

B B

C C

D D

E E

F F

4. What do these matrices represent?

5. Is it possible for Fiona to share a secret and that secret reach Caroline? What is the minimum number of times the secret is shared when Caroline knows the secret?

6. How many ways is it possible for a secret to get from Brennan to Elise in 3 or fewer secret sharing episodes?

7. George (G) joins the group and the secret sharing changes a little. Draw a vertex edge graph to describe the matrix below.

A B C D E F G

A 0 0 0 0 1 0 1

B 1 0 0 1 0 0 0

C 0 1 0 1 1 0 0

D 0 0 1 0 1 1 1

E 1 1 0 0 0 1 0

F 1 0 0 0 0 0 1

G 1 0 1 0 0 0 0

REFERENCES:

Crisler, N., Fisher, P., & Froelich, G. (1994). *Discrete mathematics Through Applications*. New York: W.H. Freeman and Company.

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