3. (a) \( V = \{ A, B, C, D, X, Y, Z \} \)
   (b) \( E = \{ AX, AX, AY, BX, BY, XY, DZ \} \)
   (c) \( A - 3, B - 2, C - 0, D - 1, X - 4, Y - 3, Z - 1 \)

4. (a) \( V = \{ A, B, C, D, E, X, Y, Z \} \)
   (b) \( E = \{ AB, AD, AE, BE, CE, DE, XY, XY, YZ \} \)
   (c) \( A - 3, B - 2, C - 1, D - 2, E - 4, X - 2, Y - 2, Z - 1 \)

6. \( \) \( \) \( \) \( \) \( \) \( \)

10. (b) \( \) \( \) \( \) \( \) \( \) \( \)

12. (a) CB, BA, AH, HF
   (b) CB, BD, DA, AH, HF
   (c) use (a)
   (d) CB, BD, DA, AH, HG, GG, GF
   (e) five: DA, DBCDA, DBA, DCBA, DCBDA
   (f) three:

(f) fifteen: any of the five from (e) then AH, then any of the three from (f). 5 \( \times \) 3 = 15.
16. (a) $BF, GF$

(b)  

\[ A \quad B \quad C \quad D \quad E \]

\[ \text{no bridges} \]

(c)  

\[ A \quad B \quad C \quad D \quad E \]

\[ \text{each edge is a bridge} \]

20.  

![Graph Diagram]

24. (a) exactly two odd vertices? has Euler path connected

(b) has more than two odd vertices? has neither connected

(c) may or may not have Euler path - depends on if graph is connected or not.
30.

44. (a) 
(b) 
(c)