Exercise-set 11.
Solutions

1. a) max $m(f) = 27$,
   b) max $m(f) = 16$, min cut: $X = \{S, A, C', E\}$.

2. a) 3, 3,
   b) 3, 3,
   c) 4, 4.

3. a) 5,
   b) 7.

4. a) $\kappa(G) = 3$, $\lambda(G) = 3$,
   b) $\kappa(G) = n$, $\lambda(G) = n$.

5. $\kappa(G) = 12$, $\lambda(G) = 12$.

6. $\kappa(G) = 8$, $\lambda(G) = 8$.

7. $\kappa(G) = 2$, $\lambda(G) = 2$.

8. $k \leq \text{mindeg}(G)$.

9. Use Dirac's theorem.

10. The degrees in the complement are less than 8.

11. a) No (counterexample),
    b) Yes (check cases of the definition).

12. At most 25.

13.

14. Use Menger's theorem. Of the 3 cycles obtained from the 3 paths between two vertices one must be even.

15. Use Menger's theorem. One of the 3 paths cannot be longer that 33.

16. Use Menger's theorem. The 2 paths form a cycle.

17. For any two vertices we need at least 3 edges to cover all the paths between them.

18. a) Check cases of the definition.
    b) Add two new vertices, and connect them to the vertices in A and B.

19. a) Use Menger's theorem.
    b) No (counterexample).