

(18) Let G be a graph, $\chi(G)$ be the chromatic number of G , and $\Delta(G) = \max \{ \deg v \mid v \text{ is a vertex of } G \}$.

(a) Give an inequality (\leq) involving $\Delta(G)$ and $\chi(G)$ which holds for all graphs G .

(b) Give an example of a graph where $=$ holds in your formula from (a).

(c) Give an example of a graph where $<$ holds in your formula from (a).

(19) Let G be a graph, $\chi(G)$ be the chromatic number of G , and $\omega(G) = \max \{ p \mid K_p \text{ is a subgraph of } G \}$.

(a) Give an inequality (\leq) involving $\omega(G)$ and $\chi(G)$ which holds for all graphs G .

(b) Give an example of a graph where $=$ holds in your formula from (a).

(c) Give an example of a graph where $<$ holds in your formula from (a).

(20) Solve the recurrence relation

$$a_{R+1} = a_R + R + 7 \quad a_0 = 0.$$

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