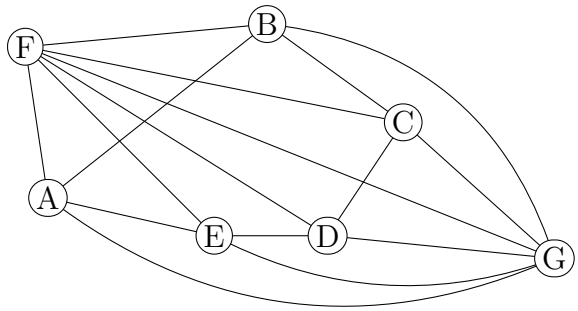
CS 173, Fall 17 Examlet 7, Part B

Name:_____

NetID:_____ **Lecture: A B**

Discussion: Thursday Friday 9 10 11 12 1 2 3 4 5 6

1. (9 points) What is the chromatic number of the graph below? Justify your answer.



2. (6 points) Check the (single) box that best characterizes each item.

Chromatic number of a graph with maximum vertex degree D

$= D$ ☐ $= D+1$ ☐

$\geq D+1$ ☐ $\leq D+1$ ☐

We have 30 tablespoons of filling and each bun will require one tablespoon. 30 is ____ on how many buns we can make.

an upper bound on ☐ exactly ☐

a lower bound on ☐ not a bound on ☐

$\sum_{k=0}^{n+1} 2^k$

$2^{n+1}+1$ ☐ $2^{n+2}-1$ ☐ $2^{n+2}-2$ ☐ $2^{n+1}-1$ ☐

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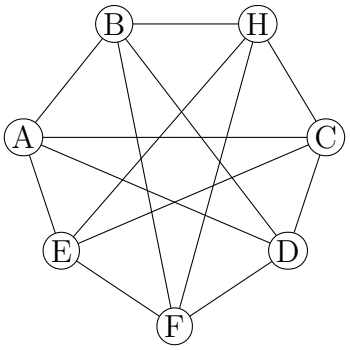
1. (9 points) What is the chromatic number of the graph below? Justify your answer.



2. (6 points) Check the (single) box that best characterizes each item.

$\sum_{i=1}^{p-1} \frac{i}{p}$ $\frac{p(p-1)}{2}$ ☐ $\frac{p(p+1)}{2}$ ☐ $\frac{(p+1)}{2}$ ☐ $\frac{(p-1)}{2}$ ☐

10 people rowed across Lake Tahoe in my canoe. 10 is ____ how many people the canoe can carry.

an upper bound on ☐ exactly ☐

a lower bound on ☐ not a bound on ☐

Chromatic number of a graph containing a W_7.

≥ 3 ☐ ≥ 4 ☐ ≥ 7 ☐ can't tell ☐

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1. (9 points) Tomas wants to plant his tomatoes so that plants are more than 1 foot apart. His garden bed is an an equilateral triangle with each side 2 feet long. Prove that four is the maximum number of tomatoes he can plant.

2. (4 points) Check the (single) box that best characterizes each item.

$\sum_{i=1}^{p-1} i$ $\frac{(p-1)^2}{2}$ ☐ $\frac{(p-1)(p+1)}{2}$ ☐ $\frac{p(p+1)}{2}$ ☐ $\frac{p(p-1)}{2}$ ☐

Putting 10 people in the canoe caused it to sink. 10 is ____ how many people the canoe can carry.

an upper bound on ☐ exactly ☐

a lower bound on ☐ not a bound on ☐

Chromatic number of a connected graph with 10 nodes. ≤ 2 ☐ $= 2$ ☐ ≥ 2 ☐ can't tell ☐

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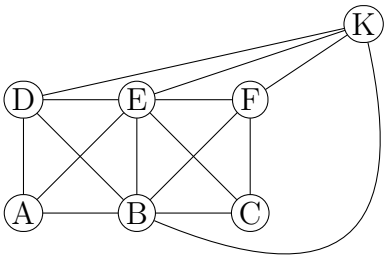
1. (9 points) What is the chromatic number of the graph below? Justify your answer.



2. (6 points) Check the (single) box that best characterizes each item.

$\sum_{k=0}^{n-1} 2^k$ $2^n - 2$ ☐ $2^n - 1$ ☐ $2^{n-1} - 1$ ☐ $2^{n+1} - 1$ ☐

C_5 is a subgraph of graph H. 3 is ____ the chromatic number of H.

an upper bound on ☐ exactly ☐

a lower bound on ☐ not a bound on ☐

Exactly 40 books fit in my suitcase by volume, but I haven't checked their total weight. 40 is ____ how many books the suitcase can hold.

an upper bound on ☐ exactly ☐

a lower bound on ☐ not a bound on ☐

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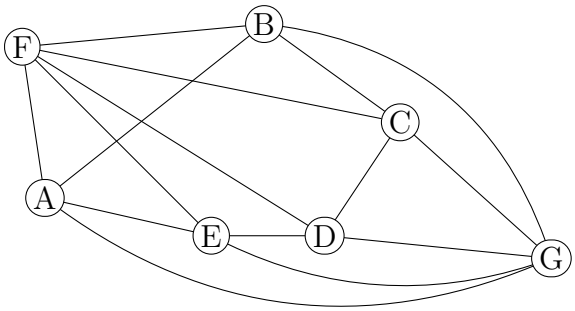
1. (9 points) What is the chromatic number of the graph below? Justify your answer.



2. (6 points) Check the (single) box that best characterizes each item.

$\sum_{k=1}^{n} 2^k$ $2^{n+1}-1$ ☐ $2^{n+1}-2$ ☐ $2^{n+1}-3$ ☐ 2^n-1 ☐

C_5 is a subgraph of graph H. 5 is ____ the chromatic number of H. an upper bound on ☐ exactly ☐ a lower bound on ☐ not a bound on ☐

Chromatic number of a bipartite graph with at least one edge 1 ☐ 2 ☐ 3 ☐ can't tell ☐

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1. (11 points) Let's define two sets as follows:

$$A = \{(4 - t^2, t + 1) : t \in \mathbb{R}\}$$

$$B = \{(x, y) \in \mathbb{R}^2 : x = 3 + 2y - y^2\}$$

Prove that $A = B$ by proving two subset inclusions.

2. (4 points) Check the (single) box that best characterizes each item.

$\sum_{k=3}^{n} k^7$ $\sum_{p=1}^{n-2} p^9$ ☐ $\sum_{p=1}^{n-2} k^7$ ☐ $\sum_{p=1}^{n-2} k^9$ ☐ $\sum_{p=1}^{n-2} (p+2)^7$ ☐

Chromatic number of $K_{m,n}$. 2 ☐ 3 ☐ 4 ☐ can't tell ☐