Name:_____

NetID:_____ **Lecture:** **B**

Discussion: **Friday** **11** **12** **1** **2** **3** **4**

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

Solution: The chromatic number is four. The picture above shows how to color it with four colors (upper bound). For the lower bound, the graph contains a W_5: the hub is node A and the rim contains nodes B, C, F, G, and E.

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

Chromatic number of a bipartite graph with at least one edge

1 ☐   2 ☑   3 ☐   can't tell ☐

Suppose I want to estimate $\frac{103}{20}$. 3 is _____

an upper bound ☐   an exact answer ☐

a lower bound ☑   not a bound on ☐

$$\sum_{k=3}^{n} k^7$$

$$\sum_{p=1}^{n-2} p^9 \ \square$$ $$\sum_{p=1}^{n-2} k^7 \ \square$$ $$\sum_{p=1}^{n-2} k^9 \ \square$$ $$\sum_{p=1}^{n-2} (p+2)^7 \ \boxed{\checkmark}$$
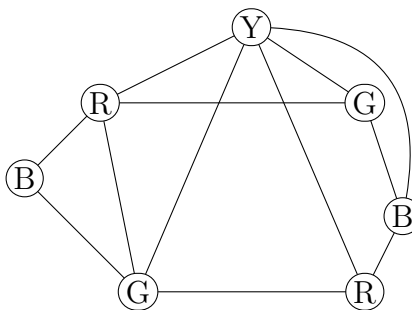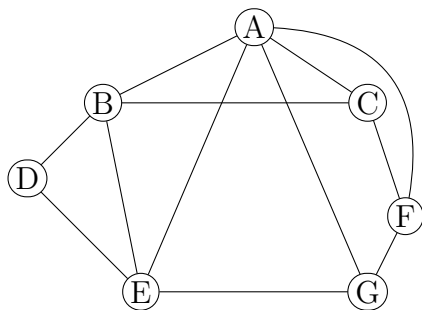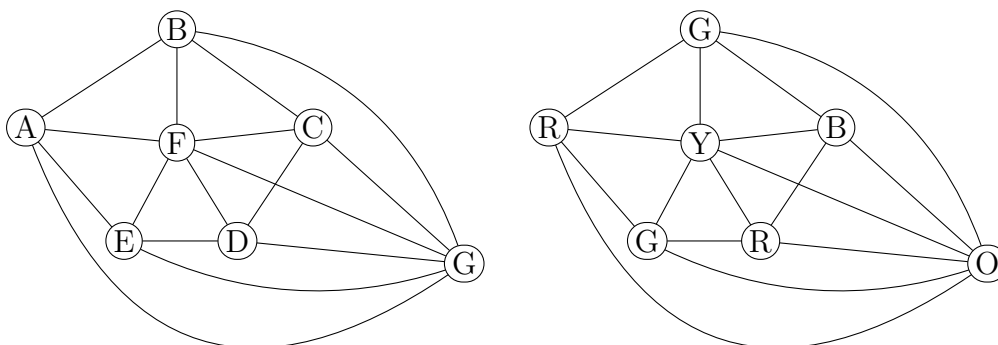
Name:

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Discussion: Friday   11   12   1   2   3   4

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

Solution: The chromatic number is five. The picture above shows how to color it with five colors (upper bound).

For the lower bound, the graph contains a W_5 whose hub is F and whose rim contains nodes A, B, C, D, E. Coloring a W_5 requires four colors. Then the node G is connected to all six nodes in the W_5, so it needs a different, fifth color.

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

Chromatic number of W_n.   2 ☐   3 ☐ ≤ 3 ☐ ≤ 4 ✓

All elements of M are also elements of X. $M = X$ ☐ $M \subseteq X$ ✓ $X \subseteq M$ ☐

$\displaystyle\sum_{k=0}^{n} \frac{1}{2^k}$ $1 - (\frac{1}{2})^{n-1}$ ☐ $2 - (\frac{1}{2})^n$ ✓ $1 - (\frac{1}{2})^n$ ☐ $2 - (\frac{1}{2})^{n-1}$ ☐