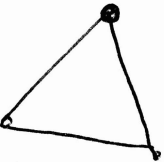


4.2:

1.  triangle; need only one guard!
 $V=3 \Rightarrow \frac{V}{3} = \underline{\underline{1}}$.

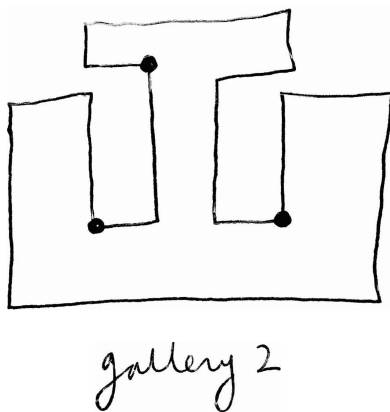
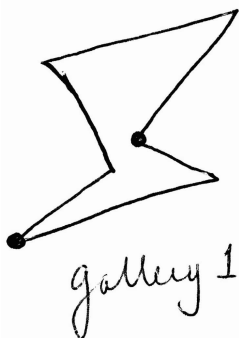
2. see text.

3. $V=12 \Rightarrow \frac{V}{3} = 4 \leftarrow$ at most 4 guards needed

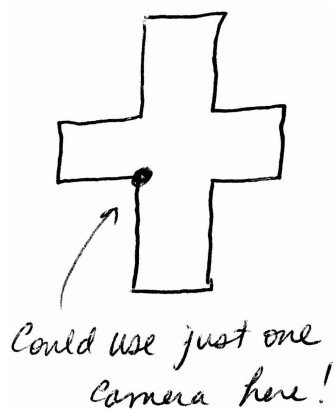
$V=13 \Rightarrow \frac{V}{3} = 4\frac{1}{3} \leftarrow$ at most 4 guards needed

$V=11 \Rightarrow \frac{V}{3} = 3\frac{2}{3} \leftarrow$ at most 3 guards needed

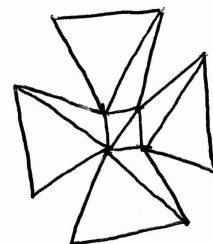
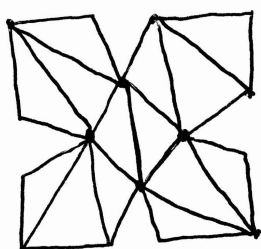
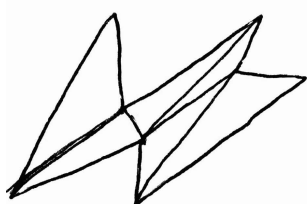
4.



5.

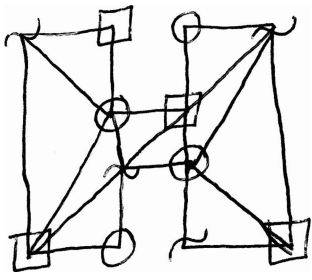
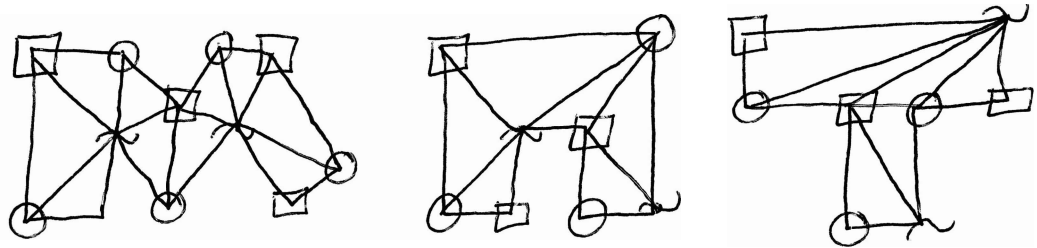


9.



(there are other possibilities as well!)

12.

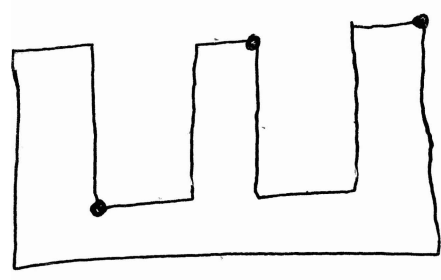


~ = Red
 □ = Blue
 ○ = Green

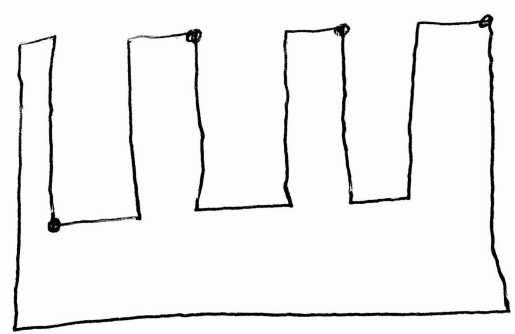
13. $6 = 1 + 1 + 4$
 $6 = 2 + 1 + 3$
 $6 = 2 + 2 + 2$

Point is that if $v=6$,
 then $\frac{v}{3} = \underline{2}$, and no matter
 what there is one of these at least
 that is ≤ 2 .

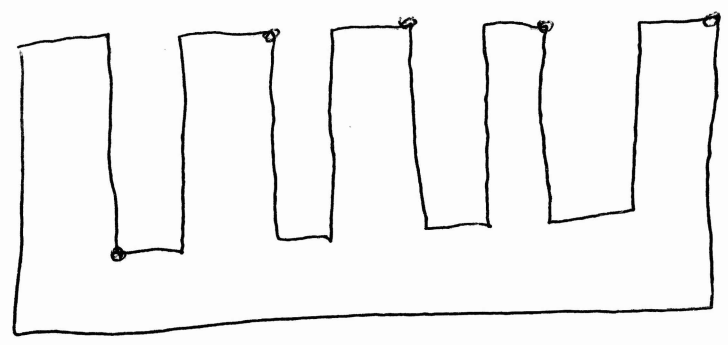
20.



12 sides, 3 guards



16 sides, 4 guards



20 sides, 5 guards.