CSCI 338 Computer Science Theory

Self-Evaluation Test (30 minutes, not to be graded)

Flip a coin, if face-up then email me a pdf file of the finished test: bhz@montana.edu.

Question 1

Given a planar graph $P = (V, E)$, we have Euler's formula: $|V| + |F| - |E| = 2$, where F (resp. E) is the set of faces (resp. edges) of P and $|F|$ (resp. $|E|$) is the size of F (resp. E). Let $|V| = n$. Prove that the number of edges in E is less than $3n$.

Question 2

Peter makes a claim "If I have a ball absolutely round in my hand, then within 30 seconds I can raise the temperature in Bozeman by 20 degrees." How do you proceed to find a counterexample for this claim?

Question 3

Prove that $1^3 + 2^3 + 3^3 + \cdots + n^3 = \frac{1}{4}n^2(n+1)^2$.