Question 1 [13 points]: Prove that AM ⊆ Π₂. (Hint: use Claims 3 and 4 from pages 1-2 of lecture 10).

Question 2 [13 points]: Prove that IP ∈ PSPACE. (Hint: Show that you can exactly calculate the probability of accepting an interactive proof by building an appropriate tree.)

Question 3 [14 points]: The class IP is defined with one-sided error, allowing for the possibility that a cheating prover might succeed. As we showed in class, when defined this way, IP = PSPACE. Suppose we redefined IP to remove soundness error. That is, suppose we define it:

1. If x ∈ L, then Pr[(P, V) (x) = 1] = 1.
2. If x ∉ L, then for any (even cheating) P* we have Pr[(P*, V) (x) = 1] = 0.

Show that under this definition, IP = NP.

Show also that this holds even if we define it as

1. If x ∈ L, then Pr[(P, V) (x) = 1] > 1/2.
2. If x ∉ L, then for any (even cheating) P* we have Pr[(P*, V) (x) = 1] = 0.