

**Assignment VIII, FYSE 130**

**Fall 2014**

**Due 10/10/14 at start of class (Last Planned Homework) (Worth double!)**

This homework assignment will form the backbone of the course for the rest of the semester. You are tasked to create a (typed) list of **25 (twenty-five)** different sports questions. In class, we have discussed the nature of what sort of questions we are looking for here, but to summarize, we're looking for questions with the following properties:

1. We're looking for questions that have definitive and testable answers. (No "opinion" questions, like "what was the best baseball team in history" – *UNLESS* you qualify this with a testable criterion like "what was the best baseball team in history based on their pythagorean win expectation, and why that is the measure we should use).
2. We're looking for questions you can't just find the answer with a few minutes of googling. (No "basic factual" questions like "How many touchdowns did the Chicago Bears score in 1977?" or "What team had the best power-play percentage in 2010?", etc.)
3. We're looking for questions that are well qualified/specific. (We need to make sure that everyone agrees on the details. "How fast could a human being run the 100 meter dash" would be an ok question, but a better question would be "How fast could an adult human being run the 100 meter dash wearing current athletic clothing on a level track surface without a tail-wind at sea level?" is better.)
4. We're looking for questions associated with popular sports in the US or can be explained if you're asked for details. (Baseball, soccer, basketball, football, hockey, track and field, volleyball, golf, etc. are straightforward enough and it is safe to assume most of us know most of the basic rules and regulations. If you come up with a Jai Alai question, however, you better know enough about the rules of the sport to help explain the question to the rest of the class. Obscure sports are ok, but realize you might be placed on the spot later on to give us further details/information.)

## Grading

This assignment asks you to hand me a list of 25 questions. We want unique answers, so the grading system that will be used is designed to encourage developing original questions.

The assignment will be originally be scored out of 40 points. The first point on each question will be awarded based on the question's appropriateness according to the rules outlined above and given in class. An additional half-point (per question!) will be awarded if the question (or a very similar variant of it) is not asked by anyone else in the class. This may require a judgement call by the professor, and I'm going to be kind of picky.

The remaining 2.5 points (out of 40) will be assigned based on an overall impression by Dr. Larsen regarding the creativity and quality of your questions as a whole. This is also a judgement call from the instructor.

Submitting more than 25 questions may earn you some extra credit.

Please try to write questions you are interested in answering (or having answered for you!)

## Good Example Questions from the Past

(Don't use these, but try to use them for inspiration).

### Questions that some Physics knowledge should allow for a fairly definitive answer

1. How much faster could a MLB player throw a baseball with a 5 foot running head start as opposed to throwing from a standstill?
2. Grass has more surface area than clay or hard courts and – consequently – you might expect friction to slow the ball down more. However, grass courts are often said to play faster than hard or clay courts. Why?
3. An opening tip-off for a basketball game is thrown so that it reaches a maximum height of 13 feet. When is the optimal time to jump to win the tip?
4. How much upward force does a gymnastics springboard supply to an average gymnast?
5. How far could a human throw a baseball on a level surface if you need not consider air resistance and gravity was cut to half of its current value?
6. In indoor target archery, how much should one compensate for arrow drop if shooting at a target 130 meters away?

### Questions that may involve googling and/or some insight plus maybe some Physics

1. Estimate how many times per year the cleanup (number 4 hitter) strikes out in the major and minor leagues? (Add the totals from all teams).
2. How many home-runs would the average American League team hit if all fences on all fields were moved in 50 feet?
3. In an average 100 m race, how many times does a freestyle swimmer take a breath?
4. How many strikes does the winning bowler of the world series of bowling usually roll in the entire tournament?
5. How many golf balls end up in the water per year on the PGA tour?

## Questions that may be best answered through direct measurement

1. How does the terminal velocity of a volleyball (or soccerball) depend on its inflation pressure? Based on your results, how might inflation pressure influence the speed of the game?
2. They make “anti-slice” golf tees for people who have difficulty hitting a straight drive. These tees are designed to help the ball come off the tee straight, but involve a larger contact area between the tee and the ball. Therefore, the drives likely go a shorter distance. Try and find out how much shorter on average.
3. Racquetballs seem like they never really go completely dead, yet some players swear that you need a fresh ball fairly frequently. Try to determine how the terminal velocity of a racquetball and the coefficient of restitution for a racquetball vary with age or usage.

## Other

Questions like these are really interesting...but if you try to answer them, you'd have to be very careful about how you qualify or simplify the question so that the answer means something.

1. How much home-field advantage is there in college football?
2. How much “fairer” is a 7 game playoff series than a 5 game playoff series?
3. How often does the “best” team win the NCAA men’s basketball tournament?
4. How much of an advantage or disadvantage is there to being assigned a middle lane in a swimming race?
5. How much further can you kick a ball in Denver than Los Angeles?
6. Does anchoring a putter increase the accuracy of a putt? Why or why not?