Driving Further

Introduction

More sophisticated club technology and customisation combined with stronger athletes is a recipe for producing longer drives off the tee, but just how much further is the modern golfer driving? The PGA and LPGA have been measuring and recording drive distances for a number of years with some surprising results.

What does it matter? For the golf courses, tournament organisers and golfers themselves it matters a great deal. The USGA (United States Golfing Association) is considering introducing 'reduced-distance' golf balls. Their claim is that golfers are driving the ball so far now that some holes and courses are being rendered almost useless. It would be incredibly expensive to change the length or nature of specific holes on a golf course as this would most likely necessitate changing the entire course. It is not possible to wind back the clock on athletic performance, but it is possible to reduce the efficiency of golf balls so they simply don't go as far.

Your task is to explore how much the distances have changed and whether or not to 'putt' and end to this proposed 'course' of action.

Data

PGA (Men's) – Average driving distance measured in metres.

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000
Distance	238.2	238.1	239.5	241.0	243.7	244.8	247.4	249.1	249.8
Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Distance	249.4	254.9	255.6	261.4	262.0	263.7	264.2	263.9	262.7

LPGA (Women's) – Average driving distance measured in metres.

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000
Distance	204.1	206.9	207.2	213.4	213.0	216.1	216.4	217.7	218.0
Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Distance	221.7	226.9	228.3	228.2	224.6	229.6	227.6	225.4	228.9

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Question: 1

Plot the graphs for the average driving distances versus year for both the PGA and LPGA data and comment on the trends.
(Two separate graphs)

Question: 2

Is a linear model appropriate for either of these data sets?

Question: 3

Find the equations of the line of best fit for the two sets of data plotted.

Question: 4

Assuming that the trends continue into the future answer the following questions:

a) Estimate the average driving distances for both tours in the year 2018.

b) When will the average driving distance for the men's tour be 310 yards?

c) When will the average driving distance for the women's tour be 270 yards?

d) Will the average driving distance for women's tour ever be higher than the average for the men's tour, according to the models obtained, if so, when?

e) Comment how realistic the predictions are by comparing the predictions to recent, real data.
The following two websites can be used to collect data.

https://www.pgatour.com/stats/stat.101.html

http://www.lpga.com/statistics/

Question: 5

Will the driving distances grow without bounds? Discuss.

Extension

The 5th hole at the Flinders Golf course is a par 5, 490m journey. In 1992 a professional golfer could plan to reach the slight dog-leg with a good first drive of 240m. Assuming the second shot is approximately 10% to 15% shorter than the drive off the tee, a professional golfer could hope to hit their second shot 210m and therefore finish with a relatively short 40m approach shot to the green. This places the golfer on the green leaving a regulation 2 putt finish.

Show how this hole is already under threat of becoming a par 4 and that further into the future it becomes *readily* achievable.

The coefficient of restitution (COR) of a golf ball is a measure of the energy returned when struck. Golf balls typically have a COR of 0.8. (80%) If this figure directly relates to driving distance, explore an appropriate COR value to ensure this Par 5 hole remains challenging for the next 10 years. (Justify your calculations / recommendations)

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TEXAS INSTRUMENTS

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