

Math 263: Excel Assignment 2

Z-Scores, Means and Standard Deviations

1. US swimmer Michael Phelps, who won eight gold medals in the 2008 Olympic Games, has often been compared with Mark Spitz, who won seven gold medals in swimming in the 1972 Olympics. Phelps broke world records in seven of his eight races; Spitz broke world records in all his races. Swimmers' times cannot be compared directly between 1972 and 2008, because technology and training have changed. (For example, when the new Speedo LZR swimsuit was introduced in February 2008, 62 world records were broken in the next six months.¹) One way of comparing wins in two different races is to calculate the z -scores of the winning times in each race. Use Excel and work in seconds throughout.

- (a) The file *Spitz-Phelps.xlsx* contains the times of each contestants in the 200-meter butterfly races in 1972 and in 2008. From this data, calculate the mean and standard deviation of the times in 2008 and in 1972. (Use =AVERAGE(array) and =STDEV(array).)
- (b) Comparing the means and standard deviations for 1972 and 2008, what can you say about the two races? (*One sentence.*)
- (c) Now recalculate the mean and standard deviation for the 1978 and 2008 races, leaving out Spitz and Phelps. Then calculate Phelps' and Spitz's z -scores for the two races. Use these means and standard deviations.
- (d) Explain in non-technical language what the z -scores tell you about who swam better, Phelps or Spitz. (*One sentence.*)

¹http://en.wikipedia.org/wiki/LZR_Racer