Based on data from *USA Today*, tax returns include an option of designating $3 for presidential election campaigns, and it does not cots the taxpayer anything to make that designation. In a simple random sample of 250 taxpayer returns from 1976, 27.6% of the returns designated the $3 for the campaign. In a simple random of 300 recent returns, 7.3% of the returns designated the $3 for the campaign.

Construct a 98% confidence interval estimate for the difference of the percentages of returns designating the $3 for the campaign in 1976 and that of the recent returns. What conclusion does the confidence interval suggest?

Listed below are 15 lengths (in minutes) of randomly selected movies (R- or PG-rated) that made at least $100 million in gross revenue:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 110 | 119 | 105 | 120 | 144 | 160 | 132 | 150 | 117 | 106 | 127 | 140 | 124 | 150 | 136 |

1. Is it possible to apply a confidence interval to estimate the mean length of all R- or PG-rated movies made at least $100 million in gross revenue? Explain why or why not. Then if yes, you answer questions b) – d). If not, you may leave questions b) – d) blank for full credit.
2. Construct a 95% confidence interval estimate of the mean length of all R- or PG-rated movies.
3. One of the movie producers believes that the mean length of all blockbuster movies has to be 120 minutes or longer. Use a 0.025 significance level to test the producer’s claim.
4. Assuming that it takes 30 minutes to empty a theater after movie, clean it, all time for the next audience to enter, and show previews, what is the minimum time that a theater manager should plan between start times of movies, assuming that this time will be sufficient for a typical movie?