**HW2**

1. The National Health Statistics Reports dated Oct. 22, 2008, included the following information on the heights (in.) for non-Hispanic white females:

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| --- | --- | --- | --- |
| **Age** | **Sample Size** | **Sample Mean** | **Std. Error Mean** |
| 20-39 | 866 | 64.9 | .09 |
| 60 and older | 934 | 63.1 | .11 |

1. Calculate and interpret a confidence interval at confidence level approximately 95% for the difference between population mean height for the younger women and that for the older women.
2. Let denote the population mean height for those aged 20-39 and denote the population mean height for those aged 60 and older. Interpret the hypotheses and , and then carry out a test of these hypotheses at significance level .001 using the rejection region approach.
3. What is the P-value for the test you carried out in (b)? Based on this P-value, would you reject the null hypothesis at any reasonable significance level? Explain.
4. What hypotheses would be appropriate if referred to the older age group, referred to the younger age group, and you wanted to see if there was compelling evidence for concluding that the population mean height for younger women exceeded that for older women by more than 1 in.?
5. The degenerative disease osteoarthritis most frequently affects weight-bearing joints such as knee. The article “Evidence of Mechanical Load Redistribution at the Knee Joint in the Elderly when Ascending Stairs and Ramps” (Annals of Biomed. Engr., 2008:467-476) presented the following summary data on stance duration (ms) for samples of both older and younger adults.

|  |  |  |  |
| --- | --- | --- | --- |
| **Age** | **Sample Size** | **Sample Mean** | **Sample SD** |
| Older | 28 | 801 | 117 |
| Younger | 16 | 780 | 72 |

Assume that both stance duration distributions are normal. Carry out a test of hypotheses at significance level .05 to decide whether true average stance duration is larger among elderly individuals than among younger individuals. (Population variances are not assumed equal.)

1. Lactation promotes a temporary loss of bone mass to provide adequate amounts of calcium for milk production. The paper “Bone Mass Is Recovered from Lactation to Postweaning in Adolescent Mothers with Low Calcium Intakes” (Amer. J. of Clinical Nutr., 2004:1322-1326) gave the following data on total body bone mineral content (TBBMC) (g) for a sample both during lactation (L) and in postweaning period (P). (Let = true mean difference in TBBMC, postweaning minus lactation.)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Subject | | | | | | | | | | |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| L | 1928 | 2549 | 2825 | 1924 | 1628 | 2175 | 2114 | 2621 | 1843 | 2541 |
| P | 2126 | 2885 | 2895 | 1942 | 1750 | 2184 | 2164 | 2626 | 2006 | 2627 |

1. Does the data suggest that true average total body bone mineral content during postweaning exceeds that during lactation by more than 25 g? State and test the appropriate hypotheses using a significance level of .05. [Note: The appropriate normal probability plot shows some curvature but not enough to cast substantial doubt on a normality assumption.]
2. Does the (incorrect) use of the two-sample t test to test the hypotheses suggested in (a) lead to the same conclusion that you obtained here? Explain.