

Math 107. Homework #1. Solutions.

3.30. (a) The mean is $\frac{1220 + 3430 + \cdots + 787}{16} = 2093^{\circ}\text{F}$.

(b) If we arrange all 16 numbers according to their sizes, i.e., 449, 563, ..., 6170, then the 8th and 9th values are 1761 and 1945 respectively. Thus, the median is equal to their arithmetic mean $\frac{1761+1945}{2} = 1853^{\circ}\text{F}$.

3.66. (a) $\bar{x} = \frac{16.2 + 15.9 + 15.8 + 16.1}{4} = \frac{64}{4} = 16$.

$s = \sqrt{\frac{(16.2 - 16)^2 + (15.9 - 16)^2 + (15.8 - 16)^2 + (16.1 - 16)^2}{4 - 1}} = \sqrt{\frac{0.1}{3}} \sim 0.18$.

(b) $\sum_{i=1}^4 x_i = 64$, $\sum_{i=1}^4 x_i^2 = 1024.1$, $n = 4$, so $S_{xx} = 1024.1 - \frac{64^2}{4} = 0.1$, and $s = \sqrt{\frac{0.1}{4 - 1}} \sim 0.18$.

3.82. (a) This set of values corresponds to items within 1 standard deviation of the mean. By Chebyshev's theorem at least 0% of the values must lie within the intervals. As you see the theorem is not particularly useful in this case ;-)

(b) This set of values corresponds to items within 2 standard deviation of the mean (since $2.6 = 5.4 - 2 \cdot 1.4$ and $8.2 = 5.4 + 2 \cdot 1.4$). Thus, from Chebyshev's theorem we infer that at least 75% of the values must lie within this interval.

(c) This set of values corresponds to items within 3 standard deviation of the mean. Thus, since $1 - \frac{1}{3^2} \sim 88.89$, at least 88.89% of the values must lie within this interval.

(d) This set of values corresponds to items within 3.5 standard deviation of the mean. Since $1 - \frac{1}{(3.5)^2} \sim 91.84$, at least 91.84% of the values must lie within this interval.

4.30 And the answer is ... ${}_{30}P_4 = 30 \cdot 29 \cdot 28 \cdot 27 = 657720$, of course.

4.40 Oooops, we have done this one during the class. The answers are 10, 6, 20, and 36, respectively.

4.58 (a) $\frac{{}_9C_2}{{}_{12}C_2} = \frac{\binom{9}{2}}{\binom{12}{2}} = \frac{6}{11}$.

(b) $\frac{{}_9C_1 \cdot {}_3C_1}{{}_{12}C_2} = \frac{\binom{9}{1}\binom{3}{1}}{\binom{12}{2}} = \frac{9}{22}$.

(c) $\frac{{}_3C_2}{{}_{12}C_2} = \frac{\binom{3}{2}}{\binom{12}{2}} = \frac{1}{22}$.