Finite Math, MATH 1100 R07

Written Homework 4

Solutions

1. The mean is given by

$$\overline{x} = \frac{25+43+57+60+61+67+75+80+88+93+98}{11} = \boxed{67.9}.$$

The variance is given by

$$s^2 = \frac{\begin{array}{r}(-42.9)^2+(-24.9)^2+(-10.9)^2+(-7.9)^2+(-6.9)^2+(-0.9)^2\\ +(7.1)^2+(12.1)^2+(20.1)^2+(25.1)^2+(30.1)^2\end{array}}{11-1} = 482.7.$$

The standard deviation is then given by $s = \sqrt{482.7} = \boxed{21.9}$. The lower half of the distribution is 25, 43, 57, 60, 61, while the upper half is 75, 80, 88, 93, 98. The median is $M = \boxed{67}$.

2. (a) $\boxed{35\%}$.

   (b) $35\% + 25\% + 5\% = \boxed{65\%}$.

   (c) The percentage is $10\% + 5\% = 15\%$. The number of patients is $100 \cdot 0.15 = \boxed{15}$.

   (d) The median M is such that 50% of the data lies below M. From the histogram we see that $20\% + 10\% + 5\% = 35\%$ of the data lies below 210 and $35\% + 35\% = 70\%$ lies below 215. Therefore M lies between 210 and 215.

3. (a) The z-score is given by $z = \frac{67-70}{3.3} = -0.91$. From the table, the area to the left of -0.91 is given by 0.18141. It follows that Mike's height is at the $\boxed{18^{th}}$ percentile.

   (b) From the tables, the corresponding z score is given by $z_0 = 1.75$. It follows that

$$\frac{x_0 - 70}{3.3} = 1.75 \Longrightarrow x_0 = 70 + 3.3 \cdot 1.75 = \boxed{75.775"}.$$

   (c) We want to find the area to the right of 69. The z-score is given by $z_0 = \frac{69-70}{3.3} = -0.30$. The area to the left of -0.30 is given by 0.38209. The area to the right is then given by $1 - 0.38209 = 0.61791$. Thus, approximately $\boxed{61.8\%}$ of adults are taller than 69".

   (d) The z-score of 72 is given by $z_{72} = \frac{72-67}{3.3} = 1.52$. The area to the left of 1.52 is given by 0.93574. The z-score of 74 is given by $z_{74} = \frac{74-67}{3.3} = 2.12$. The area to the left of 2.12 is given by 0.98300. Therefore, the area between 72 and 74 is given by $0.98300 - 0.93574 = 0.04726 \approx \boxed{4.7\%}$.

4. (a) We want to find the z-score corresponding to the 80^{th} percentile. From the tables, we have that $z_0 = 0.84$. Therefore the corresponding score x_0 is given by

$$\frac{x_0 - 153}{7.67} = 0.84 \Longrightarrow x_0 = 7.67 \cdot 0.84 + 153 = 159.4428 \approx \boxed{159}.$$

(b) We want to find the z-score corresponding to the 30^{th} percentile. From the tables, we have $z_0 = -0.52$. The corresponding score x_0 is given by

$$\frac{x_0 - 151}{7} = -0.52 \Longrightarrow x_0 = 151 - 0.52 \cdot 7 = 147.36 \approx \boxed{147}.$$

5. (a) The value $x_0 = 132$ is the 98^{th} percentile. The corresponding z-score is $z_0 = 2.06$. We have

$$\frac{132 - 100}{\sigma} = \frac{32}{\sigma} = 2.06 \Longrightarrow \sigma = \frac{32}{2.06} = \boxed{15.53}.$$

(b) The value $x_0 = 220$ is the 81.5^{th} percentile. The corresponding z-score is $z_0 = 0.9$. Therefore

$$\frac{220 - 185}{\sigma} = \frac{35}{\sigma} = 0.9 \Longrightarrow \sigma = \boxed{38.9}.$$