Key

2.2 (part 1) Assignment

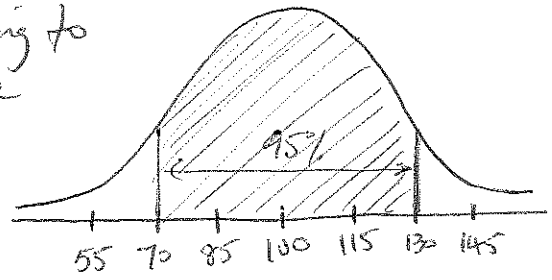
1. The scores of a reference population on the Wechsler Intelligence Scale for Children (WISC) are normally distributed with $\mu = 100$ and $\sigma = 15$.

   (a) What score would represent the 50th percentile? Explain.

   100, b/c the mean is the 50th percentile in a normal distribution

   (b) Approximately what percent of the scores fall in the range from 70 to 130? Draw a sketch to show this percent.

   approx. 95% according to 68-95-99.7 rule

   (or) check calc:
   normalcdf(70, 130, 100, 15)
   = 95.4%

   (c) A score in what range would represent the top 16% of the scores?

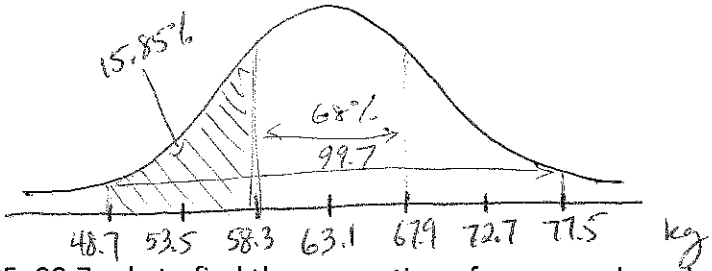
   → 100 − 16 = 84%

   x = invNorm(0.84, 100, 15) = 114.91

   ∴ score > 115 will represent to 16%

2. A study of elite distance runners found a mean body weight of 63.1 kilograms (kg), with a standard deviation of 4.8 kg. Complete the following: $\mu = 63.1$, $\sigma =$

   (a) Assuming that the distribution of weights is approximately Normal, make an accurate sketch of the weight distribution with the horizontal axis marked in kilograms.

   (b) Use the 68–95–99.7 rule to find the proportion of runners whose body weight is between 48.7 and 67.9 kg.

   99.7 − 68 = 31.7

   $\frac{31.7}{2}$ = 15.85%

   68% + 15.85% = 83.85%

   of runners has body weight between 48.7 and 67.9 kg

   (c) What proportion of runners have body weights below 60 kg?

   P(X < 60) = normalcdf(−1E99, 60, 63.1, 4.8)
   = 0.2592
   = 25.92% of runners have body weights below 60 kg.

(d) What proportion of runners have body weights above 70 kg?

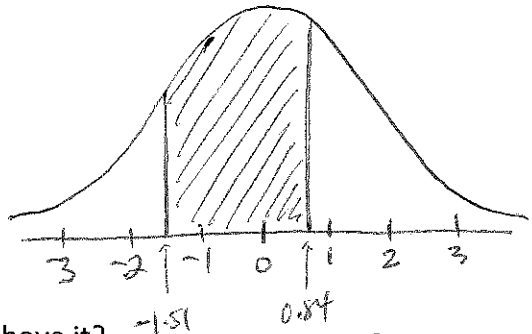
$P(x > 70)$ = normalcdf (70, 100000, 63.1, 4.8)
= 0.0753 ⇒ 7.5% of runners have body weight above 70 kg.

(e) Calculate and interpret the 45th percentile of the runners' body weight distribution.

invNorm (0.45, 63.1, 4.8) = 62.5
At the 45th percentile, the runner's body weight is 62.5kg

3. (a) Find the proportion of observations from a standard Normal distribution that satisfies $-1.51 < z < 0.84$. Sketch the Normal curve and shade the area under the curve that is the answer to the question.

normalcdf (-1.51, 0.84, 0, 1)
= 0.7340



(b) What z-score in a Normal distribution has 33% of all scores above it?

33% above it → 67% below
z = invNorm (0.67, 0, 1) = 0.44

OR use Table A and find z-score for 0.67 = 0.44

4. A local post office weighs outgoing mail and finds that the weights of first-class letters is approximately Normally distributed with a mean of 0.69 ounces and a standard deviation of 0.16 ounces.

$\mu = 0.69$, $\sigma = 0.16$

(a) What is the 60th percentile of first-class letter weights?

Figure from Table A → 0.25 = $\frac{x - 0.69}{0.16}$

$x = 0.25(0.16) + 0.69 = 0.73$ ounces

OR x = invNorm (0.6, 0.69, 0.16) = 0.73 ounces

(b) First-class letters weighing more than 1 ounce require additional postage. What proportion of first-class letters at this post office require additional postage?

$P(x > 1.0)$ = normalcdf (1, 100000, 0.69, 0.16)
= 0.0263 = 2.63% of first-class letters require additional postage.

(c) What proportion of first-class letters at this post office weigh between 0.5 and 0.9 ounces?

$P(0.5 < x < 0.9)$ = normalcdf (0.5, 0.9, 0.69, 0.16) = 0.7878

OR $z = \frac{0.5 - 0.69}{0.16} = -1.1875$ From Table A: 0.9049 − 0.1170 = 0.7879

$z = \frac{0.9 - 0.69}{0.16} = 1.3125$