STA 032 Homework 5

Hardy Jones
999397426
Professor Melcon
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§ 4.5 8 We have $F \sim N(4.1, 0.36)$

(1) We can find

$$\begin{aligned}
P(3.7 < F < 4.4) &= P(F < 4.4) - P(F > 3.7) \\
&= P\left(Z < \frac{4.4 - 4.1}{0.6}\right) - P\left(Z < \frac{3.7 - 4.1}{0.6}\right) \\
&= P\left(Z < \frac{0.3}{0.6}\right) - P\left(Z < \frac{-0.4}{0.6}\right) \\
&= P\left(Z < \frac{1}{2}\right) - P\left(Z < \frac{-2}{3}\right) \\
&\approx 0.6915 - 0.2546 \\
&\approx 0.4369
\end{aligned}$$

So approximately 43.69% of the female cats are between 3.7 kg and 4.4 kg.

(2) We just need to find

$$P(Z > 0.5) = 1 - P(Z < 0.5) \approx 1 - 0.6915 \approx 0.3085$$

So approximately 30.85% of the female cats are heavier than 0.5 standard deviations above the mean.

(3) We need to first find the closest area to 0.8. The closest area is 0.8023. This area corresponds to a z-score of 0.85.
Now we just work backwards

$$\begin{aligned}
0.85 &= \frac{x - 4.1}{0.6} \\
0.85(0.6) + 4.1 &= x \\
4.61 &= x
\end{aligned}$$

So the female cat weight on the 80^{th} percentile is 4.61kg.

(4) We can find

$$P(F > 4.5) = P\left(Z > \frac{4.5 - 4.1}{0.6}\right) \approx P(Z > 0.66) \approx P(Z < -0.66) \approx 0.2546$$

So the probability that a female cat chosen at random weighs more than 4.5kg is approximately 25.46%.

(5) We assume that the sample is large enough that each choice is independent. We want to find

$$P(F > 4.5)P(F < 4.5)^5 \approx 0.2546(1 - 0.2546)^5 \approx 0.2546(0.7475)^5 \approx 0.05858$$

So the probability that exactly one of six females cats chosen at random weighs more than 4.5 kg is 5.86%

20 (1)

(2)

(3)

21 (1)

(2)

26

§ 4.7 2 (1)

(2)

(3)

(4)

(5)

(6)

4 (1)

(2)

(3)

(4)

(5)

§ 4.8 1 (1)

(2)

(3)

(4)

2 (1)

(2)

(3)

(4)