1. The masses of a population of birds are normally distributed with mean 65 grams and standard deviation 14 grams. Find the following.

   (a) The 90th percentile of bird weights.
   (b) The 38th percentile.
   (c) The first quartile.
   (d) The third quartile.
   (e) The median. Do you notice anything special about the median?
   (f) Find a number such that 20% of the birds are above that weight.

2. Assume $X$ is normally distributed with mean 200 and standard deviation 30. Find the following.

   (a) $P(160 < X < 210)$
   (b) $P(X = 160)$
   (c) $P(X = 210)$
   (d) $P(160 \leq X \leq 210)$
   (e) A number $c$ such that $P(X < c) = 0.4$
   (f) A number $c$ such that $P(X > c) = 0.35$
   (g) Numbers $a$ and $b$ such that $P(a < X < b) = 0.68$
   (h) Numbers $a$ and $b$ such that $P(a < X < b) = 0.95$
   (i) Numbers $a$ and $b$ such that $P(a < X < b) = 0.997$
   (j) Numbers $a$ and $b$ such that $P(a < X < b) = 0.8$
Answers

1. (a) 82.94
   (b) 60.72
   (c) 55.56
   (d) 74.44
   (e) 65. The mean and median are always the same for a normal distribution.
   (f) 76.78

2. (a) 0.539
   (b) 0
   (c) 0
   (d) 0.539
   (e) 192.40
   (f) 211.56
   (g) \( a = 170.17 \) and \( b = 229.83 \). Note that these numbers are close to the values \( 170 = 200 - 30 \) and \( 230 = 200 + 30 \) that we would get using the rule that about 68% of the area under a normal curve is within one standard deviation of the mean. The actual actual area within one standard deviation is 0.68268... which contributes to the slight discrepancy we see here. Similar comments apply to problems (2h) and (2i).
   (h) \( a = 141.20 \) and \( b = 258.80 \). Close to \( 140 = 200 - 2(30) \) and \( 260 = 200 + 2(30) \).
   (i) \( a = 110.97 \) and \( b = 289.03 \). Close to \( 110 = 200 - 3(30) \) and \( 290 = 200 + 3(30) \).
   (j) \( a = 161.55 \) and \( b = 238.45 \).