MDM4U: Probabilities Using the Normal Distribution

1. Using the table for the normal probability distribution, state the corresponding probability for each specified *z*-score.
   a. $z=1.70$
   b. $z=2.38$
   c. $z=-1.14$
   d. $z=-2.07$
   e. $z=0$
   f. $z=4.8$

2. For each probability, measured from the left of the normal curve, state the corresponding *z*-score.
   a. 0.1660
   b. 0.9625
   c. 0.3710

3. For each normal distribution, determine the indicated probability.
   a. $\mu=51, \sigma=6, P(x\leq47)$
   b. $\mu=113, \sigma=9, P(x\leq130)$
   c. $\mu=27.3, \sigma=2.1, P(x\geq30)$
   d. $\mu=65, \sigma=3.6, P(x\geq83)$
   e. $\mu=208, \sigma=13, P(210\leq x\leq219)$
   f. $\mu=71.4, \sigma=3.8, P(52.3\leq x\leq76.2)$

4. For each percentage of normally distributed data, determine the specified range of values.
   a. $\mu=19, \sigma=3$, lower 30%
   b. $\mu=108, \sigma=17$, lower 74%
   c. $\mu=43, \sigma=8.2$, upper 10%
   d. $\mu=336, \sigma=7.9$, central 42%

5. The speeds of a baseball pitcher's fastballs are normally distributed, with a mean of 160 km/h and a standard deviation of 7 km/h. What is the probability that a random fastball exceeds 170 km/h?

6. The results of a standardized test are normally distributed, with a mean of 83 and a standard deviation of 4.2. What is the probability that a randomly-selected test will have a score between 80 and 90?

7. Mr. Garvin's commute times to school each morning are normally distributed, with a mean of 27 min and a standard deviation of 4 min. What is the probability that Mr. Garvin's morning commute will *not* take between 30 and 35 min?

8. The average monthly temperatures for January follow a normal distribution, with a mean of -8°C and a standard deviation of 2.1°C. What average monthly temperature marks the 15th percentile?

9. The heights of a farmer's cornstalks follow a normal distribution, with a mean of 2.5 m and a standard deviation of 0.3 m. How tall are the tallest 20% of his cornstalks?

Solutions

1a. 0.9554   b. 0.9913   c. 0.1271   d. 0.0192   e. 0.5   f. 1   2a. -0.97   b. 1.78   c. -0.33
3a. 0.2514   b. 0.9706   c. 0.0985   d. 0   e. 0.2427   f. 0.8962
4a. $x\leq17.44$ b. $x\leq118.88$ c. $x\geq53.496$ d. $331.655\leq x\leq340.345$
5. 0.0764   6. 0.7136   7. 0.7962   8. -10.94°C   9. 2.752 m