

MATH 203: PRINCIPLES OF STATISTICS 1

FALL 2024

USING THE NORMAL TABLES

Procedure: Suppose $Y \sim \text{Normal}(\mu, \sigma^2)$. For $y > \mu$, to compute

$$P(Y \leq y)$$

- Transform to Z scale

$$P(Y \leq y) = P\left(Z \leq \frac{y - \mu}{\sigma}\right) = P(Z \leq z)$$

where $z = (y - \mu)/\sigma$. Note that $z > 0$.

- Round z to two decimal places.
- Use the first the unit and first decimal place of z to determine which **row** to use, use the second decimal place to determine which **column** to use: for example for 1.68, use the row labelled 1.6 and the column labelled 0.08.
- Look up the entry in the table in that row and column.

For $y < \mu$, $z < 0$, so we use symmetry

$$P(Y \leq y) = P\left(Z \leq \frac{y - \mu}{\sigma}\right) = P(Z \leq z) = P(Z > -z) = 1 - P(Z \leq -z)$$

For interval probabilities

$$P(y_1 < Y \leq y_2) = P(Y \leq y_2) - P(Y \leq y_1)$$

1. If $Y \sim \text{Normal}(-1.5, 0.8^2)$, compute

$$P(Y \leq -1.9766)$$

Solution: 0.2743

2. If $Y \sim \text{Normal}(0.5, 0.8^2)$, compute

$$P(0.0313 < Y \leq 0.0854)$$

Solution: 0.0239

3. If $Y \sim \text{Normal}(-0.4, 2^2)$, compute

$$P(Y \leq -1.1226)$$

Solution: 0.3594

4. If $Y \sim \text{Normal}(-1.3, 1^2)$, compute

$$P(-2.0447 < Y \leq 0.8069)$$

Solution: 0.7530

5. If $Y \sim \text{Normal}(-1.1, 1.6^2)$, compute

$$P(-2.8808 < Y \leq -1.2237)$$

Solution: 0.3346

6. If $Y \sim \text{Normal}(-1.1, 2^2)$, compute

$$P(Y \leq -3.343)$$

Solution: 0.1314

7. If $Y \sim \text{Normal}(-0.5, 2^2)$, compute $P(-1.9127 < Y \leq 0.1054)$
Solution: 0.3790
8. If $Y \sim \text{Normal}(-2, 0.4^2)$, compute $P(Y > -1.9436)$
Solution: 0.4443
9. If $Y \sim \text{Normal}(1.4, 1.8^2)$, compute $P(0.5454 < Y \leq 0.7107)$
Solution: 0.0328
10. If $Y \sim \text{Normal}(0.3, 1.4^2)$, compute $P(-0.5256 < Y \leq 2.1321)$
Solution: 0.6273
11. If $Y \sim \text{Normal}(1.7, 0.2^2)$, compute $P(1.4494 < Y \leq 1.5275)$
Solution: 0.0893
12. If $Y \sim \text{Normal}(1.4, 1.4^2)$, compute $P(Y > 2.3272)$
Solution: 0.2546
13. If $Y \sim \text{Normal}(0.5, 1.2^2)$, compute $P(Y > 2.3471)$
Solution: 0.0618
14. If $Y \sim \text{Normal}(0.1, 0.8^2)$, compute $P(Y \leq -0.5222)$
Solution: 0.2177
15. If $Y \sim \text{Normal}(2, 0.2^2)$, compute $P(1.818 < Y \leq 2.0783)$
Solution: 0.4703
16. If $Y \sim \text{Normal}(-1.6, 2^2)$, compute $P(-2.2989 < Y \leq -1.3239)$
Solution: 0.1925
17. If $Y \sim \text{Normal}(-1.9, 0.8^2)$, compute $P(-2.8645 < Y \leq -1.9059)$
Solution: 0.3829
18. If $Y \sim \text{Normal}(0.8, 1.4^2)$, compute $P(0.0713 < Y \leq 0.9332)$
Solution: 0.2383
19. If $Y \sim \text{Normal}(-1, 2^2)$, compute $P(Y \leq -4.7489)$
Solution: 0.0307
20. If $Y \sim \text{Normal}(-1.7, 1.6^2)$, compute $P(Y \leq -4.6109)$
Solution: 0.0344