Suppose the random variable $Z$ has a standard normal distribution (with mean zero and variance one). We can use Table 1 to evaluate the probability $P(Z \leq t)$ [where $t$ takes any value].

Suppose I want to know $P(Z \leq 1.3)$, this is the area.

The first row and column in Table 1 correspond to the $x$-axis. ‘Inside’ the table is the area under the graph (the probability).

To evaluate $P(Z \leq 1.3)$ look at:

| $z$ | 0.00 | 0.01 | 0.02 |...
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>0.9032</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This number here corresponds to $P(Z \leq 1.3) = 0.9032$.
Evaluate \( P(Z \leq -0.56) \)

This corresponds to the area:

\[
\begin{array}{ccccccc}
Z & 0.00 & 0.01 & 0.02 & 0.03 & 0.04 & 0.05 & 0.06 & 0.07 & 0.08 \\
\hline
-0.7 & 0.2877 &
-0.6 &
-0.5 &
-0.4 &
-0.3 &
\end{array}
\]

This here is the probability

\[ P(Z \leq -0.56) = 0.2877 \]

Evaluating the value \( t \) such that \( P(Z \leq t) = \text{probability} \)

- Suppose I want to find the value on the x-axis such that \( P(Z \leq t) = 0.8907 \).
- This time I look inside the table for the number 0.8907 and read outwards.
$P(z \leq t) = 0.8907$

\[ \begin{array}{c|c|c}
 z & 0.03 & 0.8708 \\
 1.2 & 0.8888 & 0.8907 & 0.8925 \\
 & 0.9082 \\
\end{array} \]

We see that $t = 1.23$, that is $P[z \leq 1.23] = 0.9092$.

**Question:** What is $P(z \leq t) = 0.5$?

**Answer:** Since the standard normal distribution is symmetric about zero and the total area under the graph is one, then $P(z \leq 0) = 0.5$.

This area is 0.5.
a) Evaluate $P(0.6 < Z \leq 1.8)$.

By using disjoint event arguments,

$$P(0.6 < Z \leq 1.8) = P(Z \leq 1.8) - P(Z \leq 0.6)$$

Now use Normal tables to find $P(Z \leq 1.8)$ and $P(Z \leq 0.6)$

(a) Read the first column for 1.8 and the first row for 0.00, using this you will see that

$$P(Z \leq 0.6) = 0.7257$$

(b) Read the first column for 1.8 and first row for 0.00, using this we see that

$$P(Z \leq 1.8) = 0.9032$$

Therefore

$$P(0.6 < Z \leq 1.8) = 0.9032 - 0.7257.$$
(b) \( P(\bar{z} \leq -1.1) \) 
\[ = 0.1357 \]

(ii) \( P(\bar{z} \leq 0.6) \) 
\[ = 0.7257 \]

(iii) \( P(\bar{z} \leq 3.0) \) 
\[ = 0.9987 \]

(iv) \( P(\bar{z} \leq -2.12) \) 
\[ = 0.0170 \]

(c) \( P(\bar{z} \leq -1.1) \) can be interpreted as, if 
\( \bar{z} \) is a random variable with a standard normal distribution, and we were to make 100 independent draws. Then, on average about 13.57 \( (\approx 14) \) of the 100 draws would be less than or equal to -1.1.

Similarly, about 99.87 of the 100 draws will
be less than a mean 3. That mean the vast majority of the draws will take a value less than 3.

\[ (d) \pi P(Z > -1.1) \]
\[ = 1 - P(Z \leq -1.1) \]
\[ = 1 - 0.1357 \]

(ii) \[ P(Z > 0.6) \]
\[ = 1 - P(Z \leq 0.6) \]
\[ = 1 - 0.7257 \]

(iii) \[ P(Z > 3.0) \]
\[ = 1 - 0.9987 \]

(iv) \[ P(Z > -2.12) \]
\[ = 1 - P(Z \leq -2.12) \]
\[ = 1 - 0.0170 \]
(e) \( P(-1.1 < z \leq 0.6) \)
\[
= P(z \leq 0.6) - P(z \leq -1.1)
\]
\[
= 0.7257 - 0.1357
\]

(ii) \( P(-2.12 \leq z \leq 3.0) \)
\[
= P(z \leq 3.0) - P(z \leq -2.12)
\]
\[
= 0.9977 - 0.0170
\]

(2) \( P(-2.12 \leq z \leq 0) \)
\[
= P(z \leq 0) - P(z \leq -2.12)
\]
\[
= 0.5 - 0.0170
\]