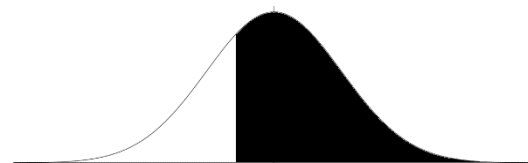


## Part 2.2: More Than

In the first section we focused just on finding the probability that something was up to a certain amount. This time we will be looking at the probability that it is more than a certain amount. For these the diagram of what we are trying to find out looks like this one on the right. The method that we use is almost identical to the method we used in the last lot of questions... so an example.



### Example

The weights of Great Spotted kiwi birds are normally distributed with a mean of 2.8 kg and a standard deviation of 0.58 kg. Calculate the probability that a randomly selected kiwi weighs more than 2.4 kg.

### Answer (Graphics Calculator)

As we are after everything **more** than 2.4kg, our Lower (or minimum amount) is 2.4. The Upper (or maximum amount) is 999999999999 (the nine key pushed a lot of times), the  $\sigma$  (or standard deviation) is 0.58 and the  $\mu$  (or mean) is 2.8.

```
Normal C.D
Lower : 2.4
Upper : 9.9999E+11
σ : 0.58
μ : 2.8
Save Res: None
Execute
```

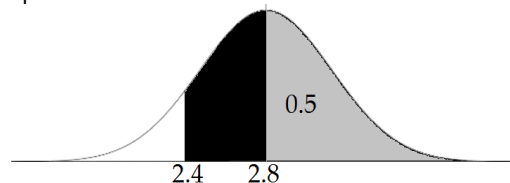
Pressing the execute button tells us that the probability is 0.755 (3sf) which is our answer ☺

### Answer (Tables)

Again, the first thing we need to do is calculate the Z value.  $Z = \frac{2.4 - 2.8}{0.58} = -0.690$  (3dp)

Again we pretend that the number is positive and look it up in the table. 0.2549... now this is the difference from the middle to the point we want. So we add this onto 0.5 to give us 0.7549 which rounds to 0.755 (3sf) the same as with the graphics calculator.

The sort of diagram that you might use in this example is shown below.



## Exercise 2.2

- The length of phone calls to a call centre are normally distributed with a mean of 2.4 minutes and a standard deviation of 0.8 minutes. What is the probability that a call lasts more than 4 minutes?
- The cost of a kilo of porter house steak is normally distributed with a mean of \$25 with a standard deviation of \$4.20. What is the probability that the steak costs more than \$32 a kilo?
- The average size of a 3 bedroom house is normally distributed with a mean of 180 m<sup>2</sup> and a standard deviation of 50 m<sup>2</sup>. What is the probability that a 3 bedroom house is more than 200 m<sup>2</sup>?
- The weight lost by a person on a particular diet has a mean of 3.2 kg over 6 months with a standard deviation of 2 kg. What is the probability that someone loses over 5 kg?
- The size of a hot water bottles are normally distributed with a mean of 1.1 L with a standard deviation of 0.2 L. What is the probability that the hot water bottle can hold more than 0.8 L?
- The average weight of a new born baby is 3.4 kg with a standard deviation of 0.51 kg. What is the probability that a new born baby weighs more than 4 kg?
- The flight time from Auckland to Wellington is normally distributed with a mean of 47 minutes and a standard deviation of 5 minutes. What is the probability that the flight lasts for more than an hour?
- The distance travelled by a commuter in Auckland is normally distributed with a mean of 30 km and a standard deviation of 10 km. What is the probability that a commuter travels more than 43 km each day?