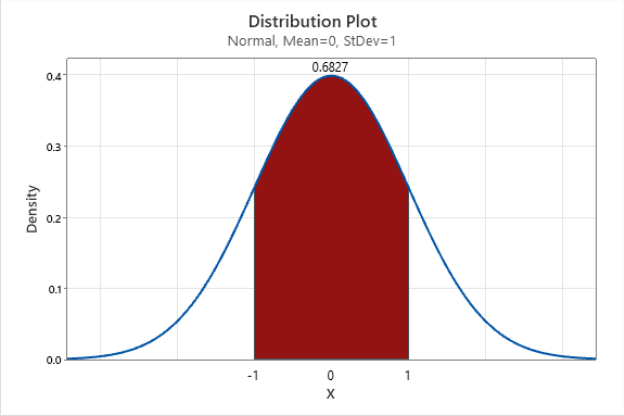
Extra exercise 7

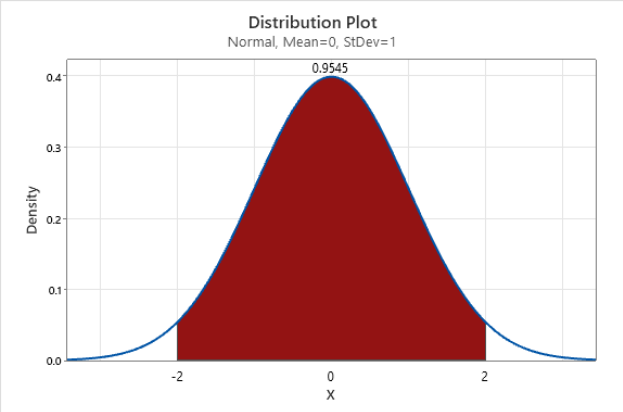
Part (a)

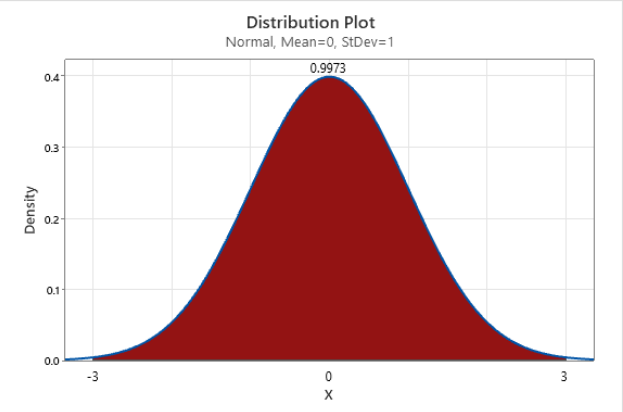
The figure below shows the area within ± one standard deviation of the mean in the standard normal distribution N(0, 1), that is, between -1 and 1. The computed probability is 0.6827, up to round-off error matching the 68% of the 68-95-99.7 rule. The figure was obtained by selecting "Middle" area and entering the two endpoints after the shaded area was defined by "X Value".



Part (b)

We repeat the process for the intervals (-2,2) and (-3,3). Also here the 68-95-99.7 rule provides reasonable approximations to the exact values: 0.9545 and 0.9973, respectively.





Part (c)

Human pregnancies follow N(266, 16). You may either change the mean and standard deviation in the Minitab menu accordingly and base your answers on its values, or apply the 68-95-99.7 rule directly without using software. Here the answers are shown for the latter approach.

i) 99.7% of human pregnancies lie within: $266 \pm 3 \cdot 16 = (218, 314)$.

ii) Pregnancies longer than 282 days (mean + 1 standard deviation) occur with probability $(100\% - 68\%)/2 = 16\%$. This is half of the area under the curve (probability) outside the mean ± 1 standard deviation — which is $(100\% - 68\%) = 32\%$.