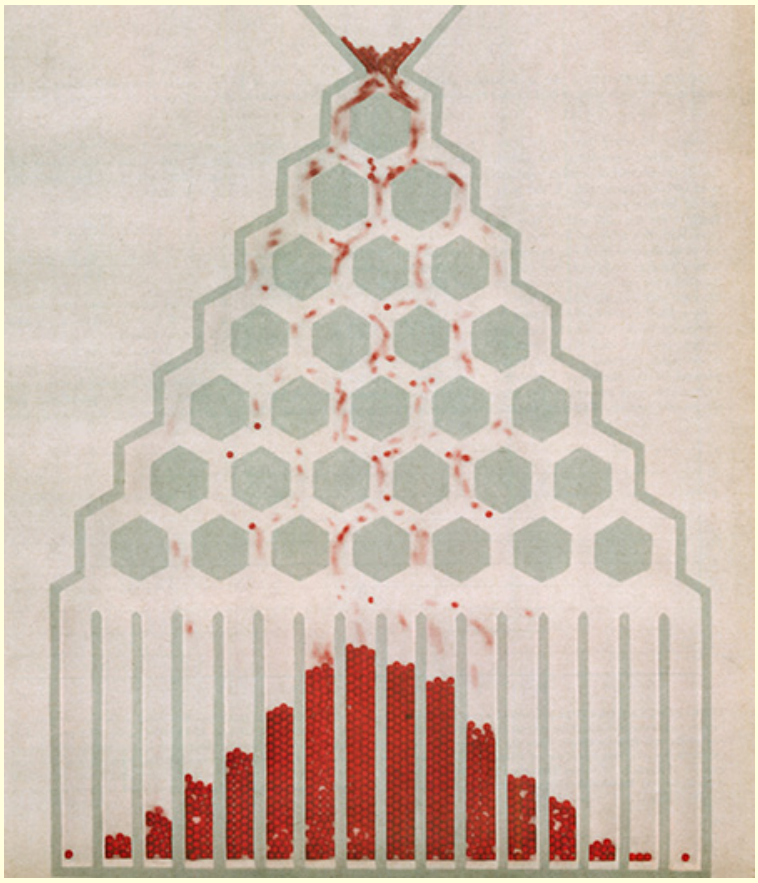
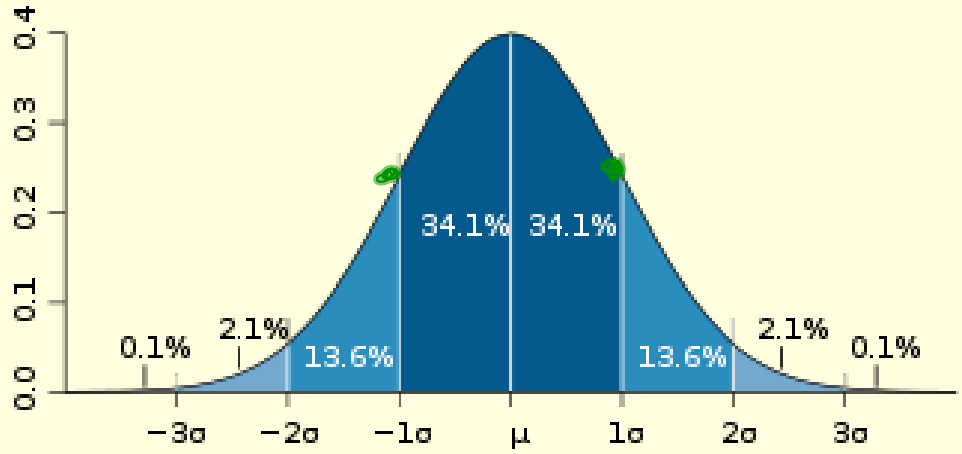
The Normal Distribution



Characteristics of the Normal Distribution



- 68.2% between $\mu + \sigma$, $\mu - \sigma$
- 95.4% between $\mu \pm 2$ sd.
- 99.7% " $\mu \pm 3$ sd.

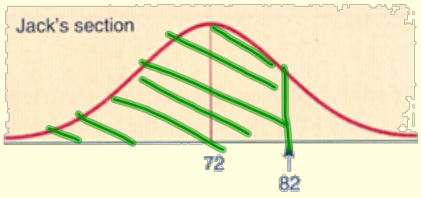
- bell shape, highest over μ
- symmetrical, vertical line at μ
- Mean = median = mode

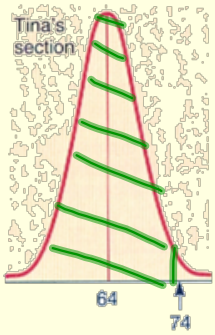
Notation for the normal distribution: $X \sim N(\mu, \sigma^2)$

"X is a random variable that is normally distributed with a mean of μ and a variance of σ^2"

When we're looking at very different sets of data, sometimes it's hard to make a comparison. Who did better in their section: Jack or Tina?

Distributions of Midterm Scores





Jack: $\mu = 72$, $\sigma = 8$

Notation: $X \sim N(72, 8^2)$

Find $P(X < 82)$.

Tina: $\mu = 64$, $\sigma = 4$

Notation: $X \sim N(64, 4^2)$

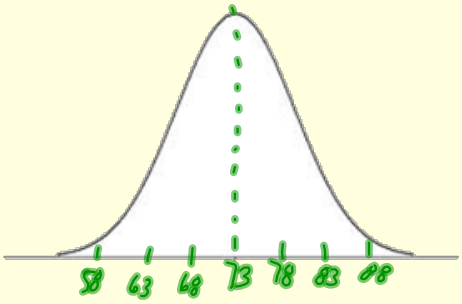
Find $P(X < 74)$.

1. Data collected over a period of years show that the daily temperatures in Honolulu are normally distributed with an average temperature of 73°F and a standard deviation of 5°F.

a) Label the normal distribution diagram to illustrate this information.

Notation:

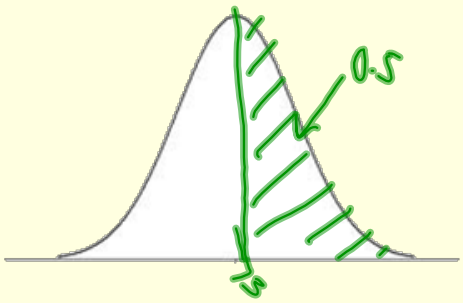
$X \sim N(73, 5^2)$



b) Find the probabilities for each daily temperature in Honolulu. Label and shade each normal distribution diagram

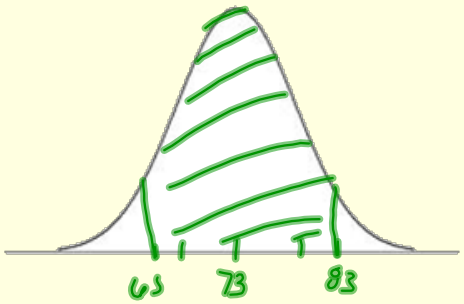
i) $P(X > 73)$

0.5



ii) $P(63 < X < 83)$

0.954

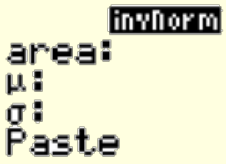


iii) $P(X < 70)$

0.274

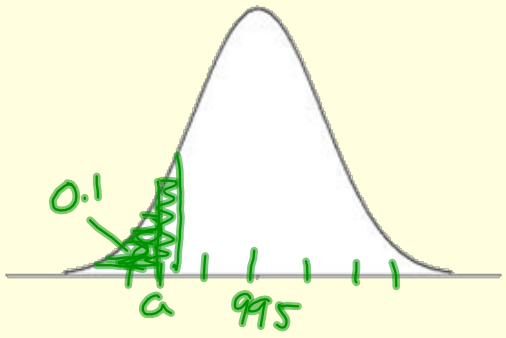
In the previous section, you used your GDC and normcdf to find the area (or probability) underneath the normal curve given certain boundary conditions.

Now you will reverse that process. Given you know the probability (or area) of a particular event, can you find the boundary conditions? You will use invNorm:



The "area" must always be entered as the area to the left of the boundary you are looking for. That means you might have to do some calculations first. And you should always sketch the curve and shade an approximation of the area.

1. The volume of cartons of milk is normally distributed with a mean of 995 ml and a standard deviation of 5 ml. It is known that 10% of the cartons have a volume less than a ml.



Find the value of a.

invNorm

Area = 0.1

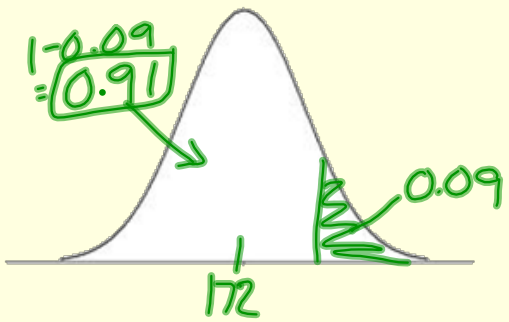
$\mu = 995$

$\sigma = 5$

$a = 988.6$ ml

2. The heights of candidates for the post of air hostess are normally distributed with a mean of 172 cm and a standard deviation of 9 cm. Nine percent of candidates are rejected for being too tall.

Find the critical height for an air hostess.



Area = 0.91

$\mu = 172$

$\sigma = 9$

Critical ht: 184cm