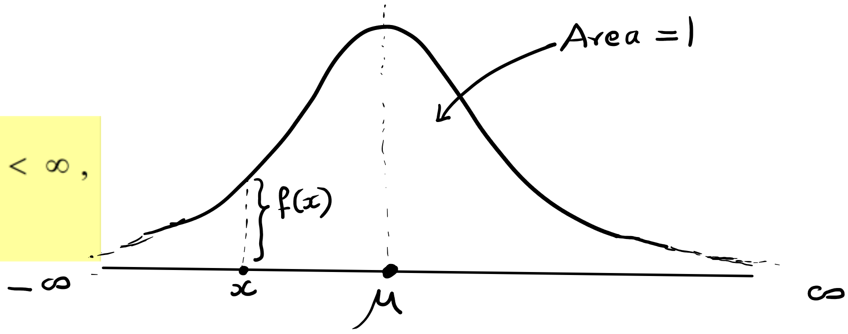
# Normal

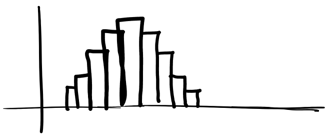
Friday, November 24, 2023 9:43 AM

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}, -\infty < x < \infty,$$
$$-\infty < \mu < \infty, \sigma > 0$$




$$E(X) = \mu$$

$$\int_{-\infty}^{\infty} f(x)\,dx = 1$$



ppf : percent point function

sf : survival function

X + or - a : Change of Origin
X / a or aX: Change of Scale

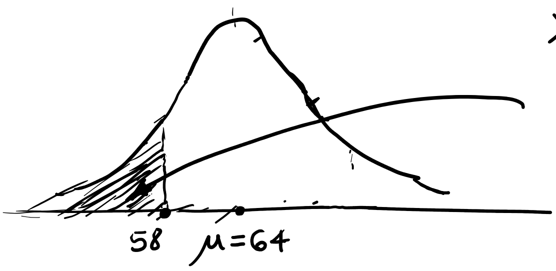
$$\therefore f(z) = \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}}, -\infty < z < \infty$$

In case of continuous distributions, $P[X<k] \approx P[X \leq k]$ &
$P[X>k] \approx P[X \geq k]$

Suppose that the height of a female in a geographical region is normally distributed with μ = 64 inches and σ = 4 inches.

- What is the probability of finding a woman who will be less than 58 inches tall ?

loc = 64 scale = 4




X: ht (inches) of females

$P[X < 58] \approx P[X \leq 58]$ cdf

$$= \int_{-\infty}^{58} f(x)\,dx$$

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norm.cdf(58, 64, 4)
0.06680720126885807
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Suppose the weight of a typical male in a geographical region follows a normal distribution with μ = 180lb and σ = 30lb.
What fraction of males weigh more than 200 pounds?

loc = 180 scale = 30

X: wt (lb) of a male

? $P(X > 200)$

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norm.sf(200, 180, 30)
0.2524925375469229
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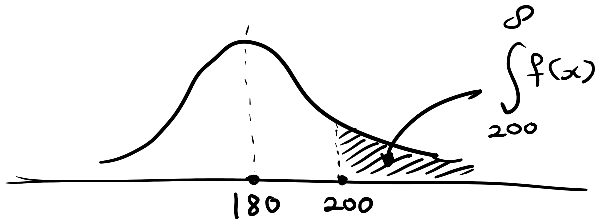
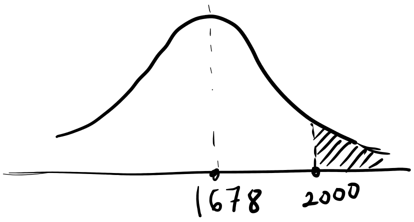



$$\int_{200}^{\infty} f(x)\,dx$$

In an insurance company, daily amount of claims is normally distributed with mean \$1678 with standard deviation \$500. Find the following: loc = 1678 , scale = 500

a) Probability that amount exceeds \$2000

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norm.sf(2000, 1678, 500)
0.2597877169966792
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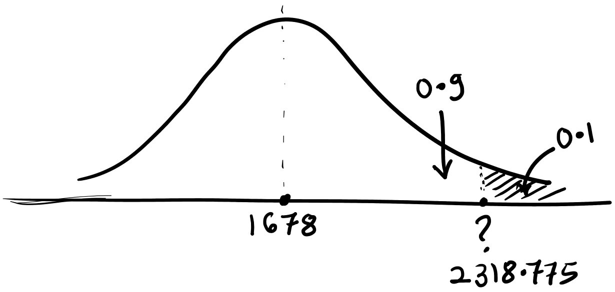
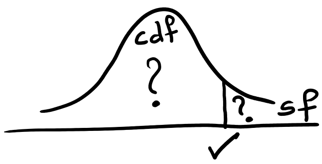
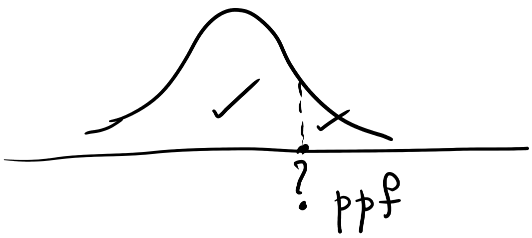
What is the minimum amount of claims for the top 10% of the daily claims?

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norm.ppf(0.9, 1678, 500)
2318.7757827723003
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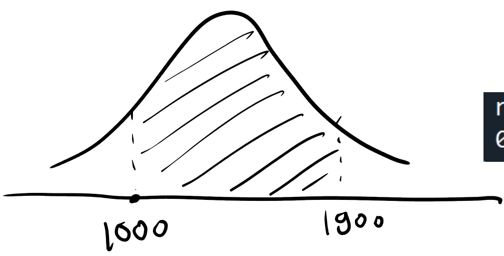
Probability that the amount is between \$1000 and \$1900.




cdf(1900) - cdf(1000)

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norm.cdf(1900,1678, 500 ) - norm.cdf(1000,1678, 500)
0.5839291240185736
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