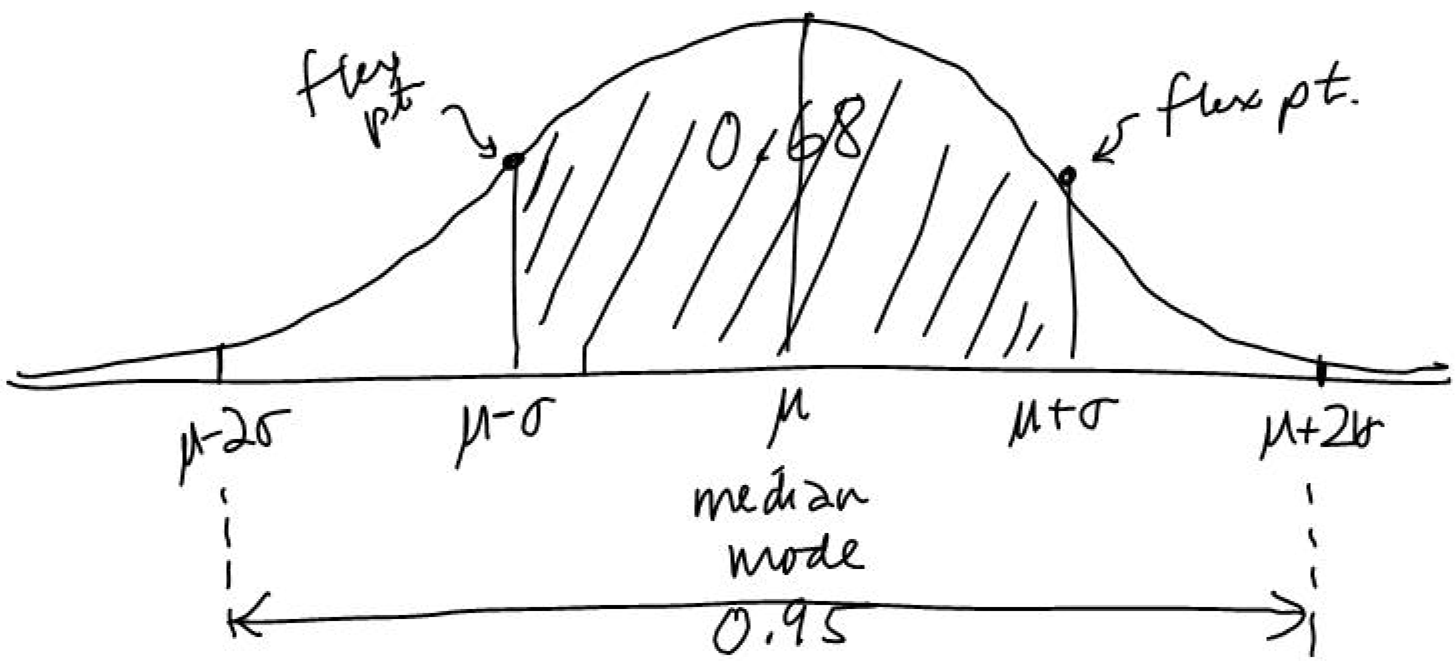
A special continuous distribution

The Normal Distribution

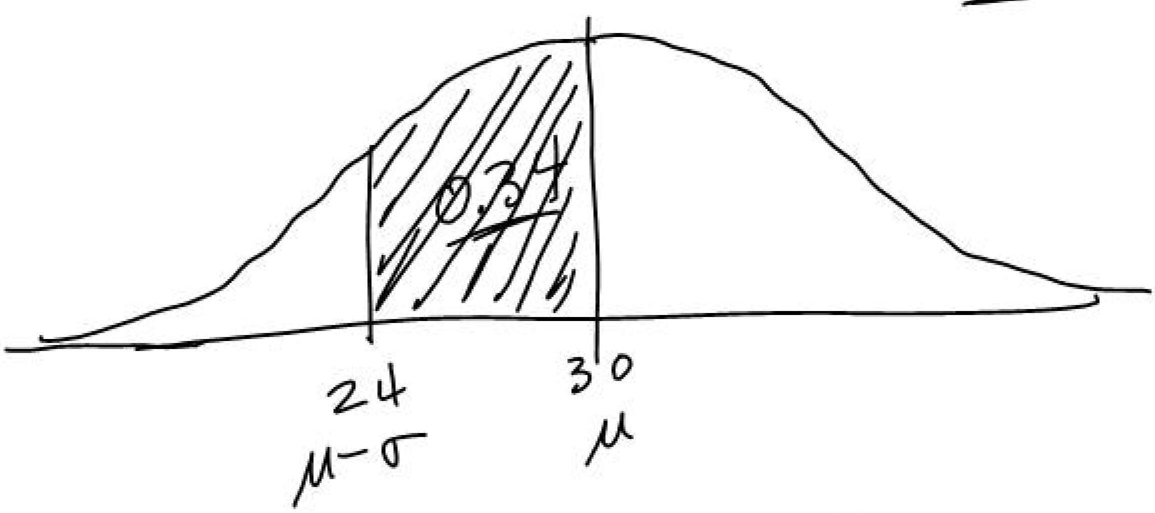
p.d.f. is $f(x) = \dfrac{e^{-\frac{x^2}{2}}}{\sqrt{2\pi}}$



Within 3σ of the mean, we have .997 of the data.

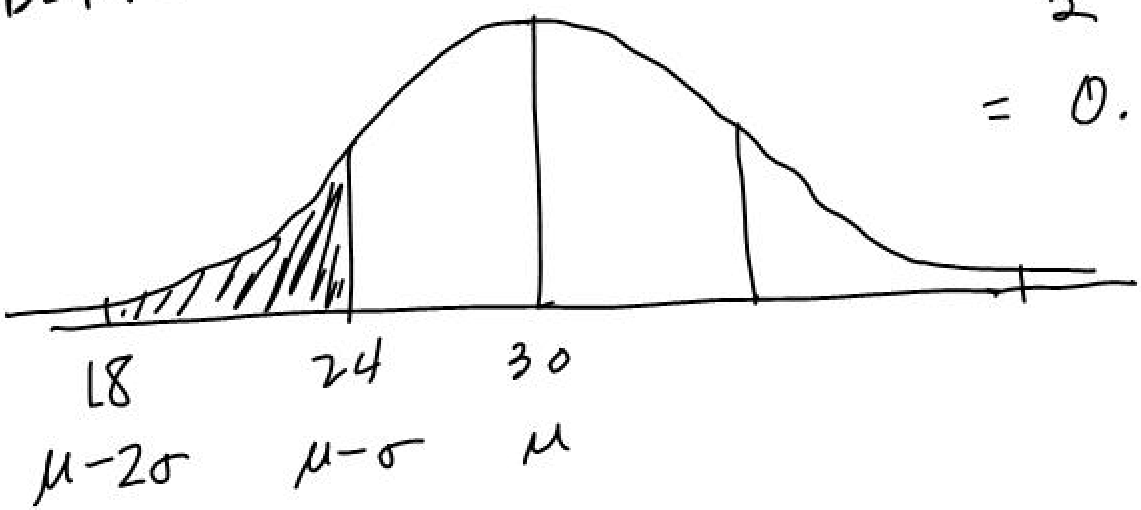
Ex. The average weight of a cabbage is 30 oz. with a standard deviation of 6 oz. Select a cabbage at random.

(a) Find the probability of the weight being between 24 and 30 oz. $\underline{0.34}$



(b) Find the prob. of the weight being between 18 and 24 oz.

$$\frac{.95}{2} - 0.34$$
$$= 0.135$$



Let X = the weight of randomly selected cabbage

$$X \sim N(\underset{\mu}{30}, \underset{\sigma^2}{6^2})$$

(c) $P(28 < X < 33) = P(\underline{\underline{28}} \leq X \leq \underline{\underline{33}})$

The z-score = how many std. dev. a value is above or below the mean

$$\boxed{z = \frac{X - \mu}{\sigma}}$$

$$z = \frac{28 - 30}{6} = -\frac{1}{3}$$

$$z = \frac{33 - 30}{6} = \frac{1}{2}$$

$$P(28 < X < 33) = P\left(-\frac{1}{3} < Z < \frac{1}{2}\right) = 0.322$$

(d) $P(X < 25) = P(Z < -5/6)$

$$z = \frac{25 - 30}{6} = \frac{-5}{6}$$

$$= \text{normalcdf}(-9, -5/6)$$

(e) Find the minimum weight of cabbage in the top 10% of weights.

90th percentile

Find z for the 90th percentile.

$$z = \text{invnorm}(0.90) = 1.2816 = \frac{x - 30}{6}$$

$$\boxed{x = 37.7 \text{ oz}}$$

$$z = \frac{x - \mu}{\sigma}$$

(f) A new shipment of cabbages arrives. Their mean weight is 33 oz. 20% of these cabbage weigh more than 39 oz. Find the std. dev. of the weights.

80th percentile

$$z = \text{invnorm}(0.80) = 0.84162 = \frac{39 - 33}{\sigma}$$

$$\boxed{\sigma = 7.13 \text{ oz}}$$

HW $\boxed{10P}$ # 1 – 5

* quiz

derivatives + integrals