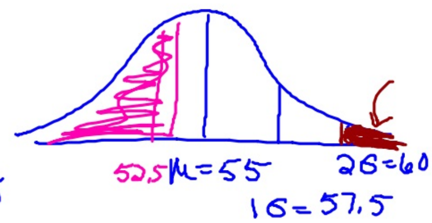
Ex) Eggs laid by chickens have mass that is normally distributed, with mean 55g and standard deviation 2.5g

what is the probability that:



a) an egg weighs more than 59g?

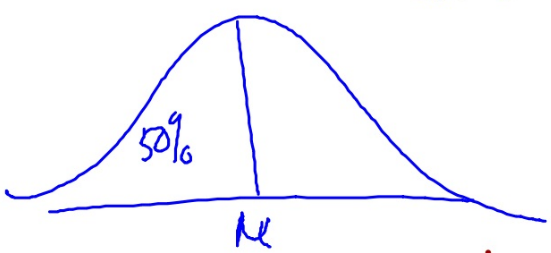
$\text{Normcdf}(\overset{LL}{59}, \overset{UL}{9.9 \times 10^{99}}, 55, 2.5) = 0.0548$

b) egg is smaller than 53g?

$\text{Normcdf}(-9.9 \times 10^{99}, 53, 55, 2.5) = 0.212$

c) $P(52 < w < 54) =$

$\text{Normcdf}(52, 54, 55, 2.5) = 0.230$



HW 15 J p. 514 #1, 2, 5

Inverse Normal Distribution

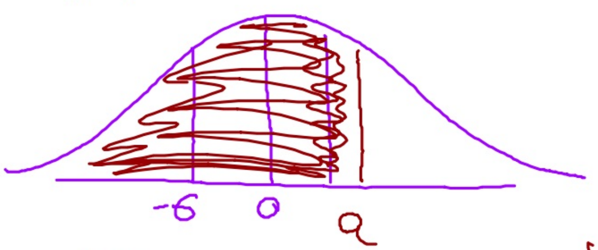
(aka "I give you the probability, you find Z or X)

\# of std dev from μ

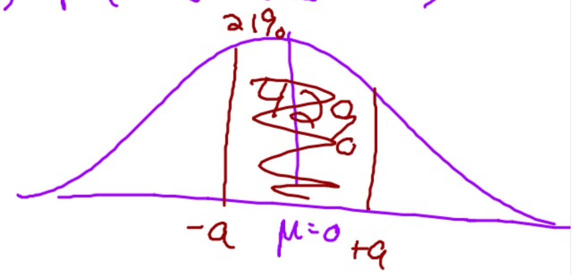
area under the curve - probability up to X

Ex) GIVEN THAT $Z \sim N(0,1)$
USE GDC to FIND a

a) $P(Z < a) = 0.877$



b) $P(-a < Z < a) = 0.42$



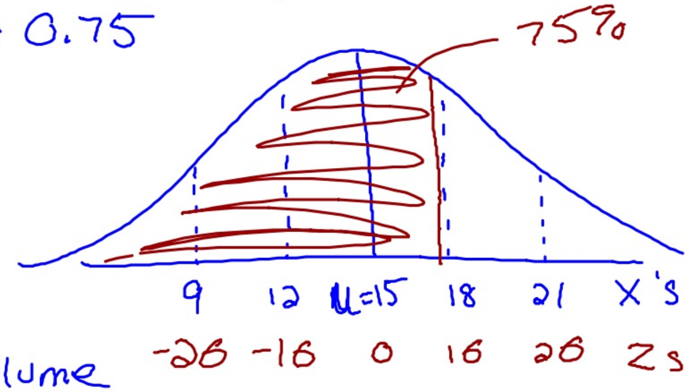
InvNorm(0.877, 0, 1) = 1.16
(P, μ, σ)

$\frac{1}{2}(1 - .42) = 0.29$

$P(Z < a) = 1 - 0.29$
$= .71$

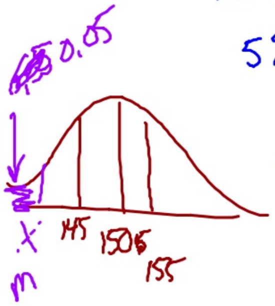
InvNorm(.71, 0, 1) =
.533

Ex) Given that $X \sim N(15, 3^2)$, determine where $P(X = x) = 0.75$



InvNorm(0.75, 15, 3) = 17

Ex) Cartons of juice Volume is normally dist with $\mu = 150$ ml and $\sigma = 5$ ml. 5% of cartons are rejected for having too little juice.



Find the minimum volume, to the nearest ml, that a carton has in order to not be rejected.

$P(V < m) = 0.05$

InvNorm(0.05, 150, 5) = 142 ml

#W 15L
p. 548 #1-3

1 $X \sim \mathrm{N}(5.5, 0.2^2)$ $\mathrm{P}(X > a) = 0.235$

$\mathrm{P}(x < a) = 0.765$ $\therefore a = 5.64$

2 $M \sim \mathrm{N}(420, 10^2)$

a $\mathrm{P}(M < a) = 0.25$ $\therefore a = 413$

b $\mathrm{P}(M < b) = 0.9$ $\therefore b = 433$

3 $X \sim \mathrm{N}(502, 1.6^2)$

a $\mathrm{P}(x < 500) = 0.106$

b $\mathrm{P}(500 < x < 505) = 0.864$ or 86.4%

c $\mathrm{P}(x < b) = 0.975$ $b = 505.1$ $a = 498.9$

$a = 499$ $b = 505$

4 $X \sim \mathrm{N}(550, 25^2)$

a $\mathrm{P}(520 < X < 570) = 0.673$

b $\mathrm{P}(X > a) = 0.1$ $\therefore \mathrm{P}(X < a) = 0.9$ $\therefore a = 582$

5 **a** $X \sim \mathrm{N}(55, 15^2)$, $\mathrm{P}(x > d) = 0.05$, $d = 79.7$

b $\mathrm{P}(x < f) = 0.90$, $f = 35.8$

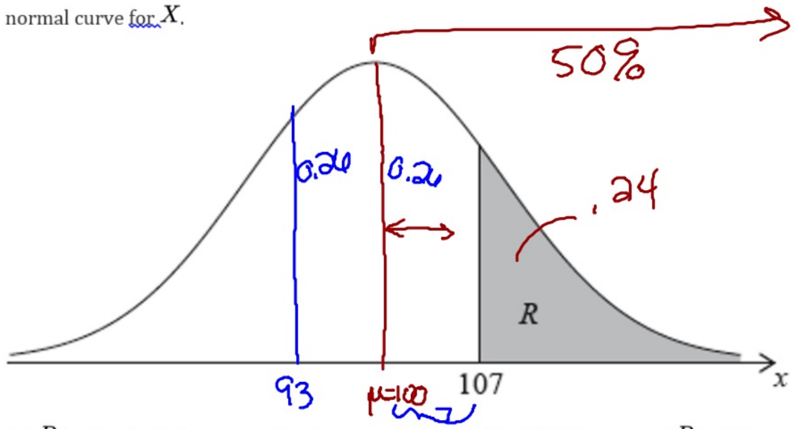
1. *[7 marks]*

The heights of adult males in a country are normally distributed with a mean of 180 cm and a standard deviation of σ cm. 17% of these men are shorter than 168 cm. 80% of them have heights between $(192 - h)$ cm and 192 cm.

Find the value of h.

2a. *[1 mark]*

The random variable X is normally distributed with a mean of 100. The following diagram shows the normal curve for X.



Let R be the shaded region under the curve, to the right of 107. The area of R is 0.24.

Write down $\mathrm{P}(X > 107)$.

2b. *[3 marks]*

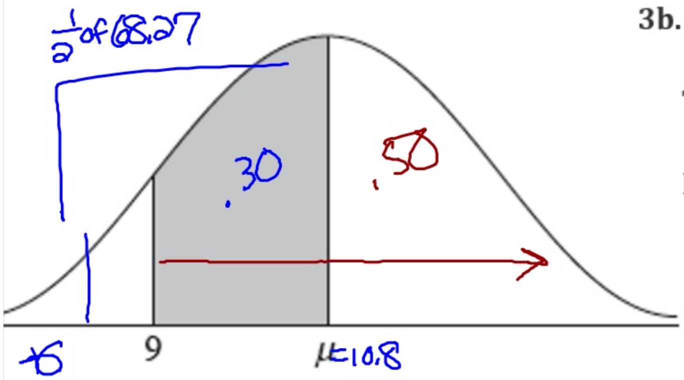
Find $\mathrm{P}(100 < X < 107)$. $0.50 - 0.24 = 0.26$

2c. *[2 marks]*

Find $\mathrm{P}(93 < X < 107)$. $0.26 + 0.26 = 0.52$

marks]

random variable X is normally distributed with mean μ. In the following diagram, the shaded region between 9 and μ represents 30% of the distribution.



nd $\mathrm{P}(X < 9)$. $0.50 - 0.30 = 0.20$

3b. *[3 marks]*

The standard deviation of X is 2.1.

Find the value of μ.

$0.3 =$

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

$-0.879 = \frac{9 - \mu}{2.1}$

3c. *[5 marks]*

The random variable Y is normally distributed with mean λ and standard deviation 3.5. The events $X > 9$ and $Y > 9$ are independent, and $P((X > 9) \cap (Y > 9)) = 0.4$. $= P(X>9) \cdot P(Y>9)$

Find λ.

$0.4 = 0.8 \cdot P(Y>9)$

$P(Y>9) = 0.5 \Longrightarrow \lambda$

$\lambda = 9$

3d. *[5 marks]*

Given that $Y > 9$, find $\mathrm{P}(Y < 13)$.