$$Z = \frac{X-\mu}{\sigma}$$

9. The random variable $X \sim N(10, 4)$. Find $P(9.1 < X < 10.3)$

$\mu$ → 10, $\sigma^2$ → 4, $\sigma = 2$

$Z \sim N(0,1)$

$$Z = \frac{9.1-10}{2} = \frac{-.9}{2} = -.45$$

$$Z = \frac{10.3-10}{2} = \frac{3}{2} = 15$$

$P(-45 < Z < 15)$

$\boxed{= 233}$

10. The random variable $X \sim N(48, 81)$.

$\mu$ → 48, $\sigma^2$ → 81, $\sigma$ → 9

a. Find $P(X < 52)$

$$Z = \frac{52-48}{9} = \frac{4}{9}$$

$\approx 672$

b. Find $P(X \geq 42)$

$\approx 748$

c. Find $P(37 < X < 47)$

$\approx 345$

11. Eggs laid by a chicken have mass normally distributed, with mean 55 g and standard deviation 2.5 g. What is

a. Probability that an egg weighs more than 59 g

$$Z = \frac{59-55}{2\ 5} = 1\ 6$$

$1 - P(Z < 1\ 6)$

or

$P(Z < -1.6)$

or

if using calculator

normalcdf

Lower 1.6

upper 1E99

$\mu = 0$

$\sigma = 1$

$\boxed{.0548}$

b. Probability that an egg weighs between 52 g and 54 g

$$Z = \frac{52-55}{2.5} \qquad Z = \frac{54-55}{2\ 5}$$

$P(-12 < Z < -4)$

$\boxed{.2295}$

c. Probability than an egg weighs less than 53 g

$$Z = \frac{53-55}{2\ 5} = -8$$

$P(Z < -8)$

$\boxed{= .2119}$

12. Given that $Z \sim N(0,1)$ use your GDC to find $a$.

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

$a = 1\ 16$

*In calc invNorm area = 877 $\mu = 0$ $\sigma = 1$ → 1 16

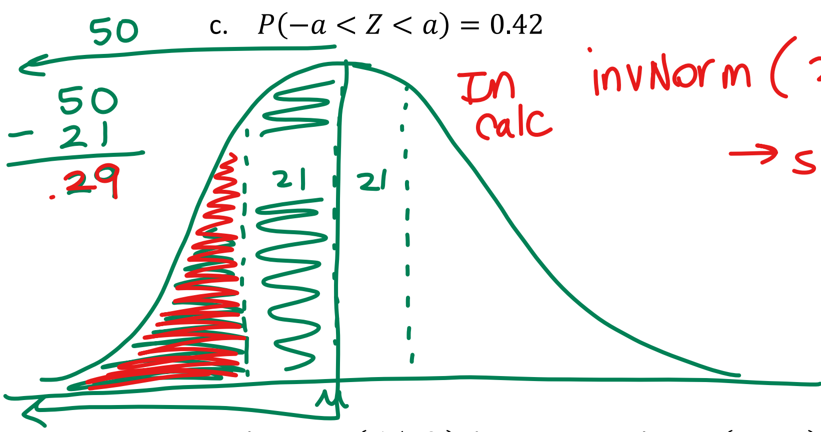
b. $P(Z > a) = 0.2$

$1 - 2 = 8$

$P(z < a) = 8$ OR $P(z < -a) = 2$

$a = 842$

c. $P(-a < Z < a) = 0.42$




In calc

invNorm ( 29, 0, 1 )

→ spit out − 553

So $a = 553$

13. Given that $X \sim N(15, 9)$ determine $x$ where $P(X < x) = 0.75$

$\mu = 15$

$\sigma = 3$

$P\left(z < \frac{X - 15}{3}\right) = 75$

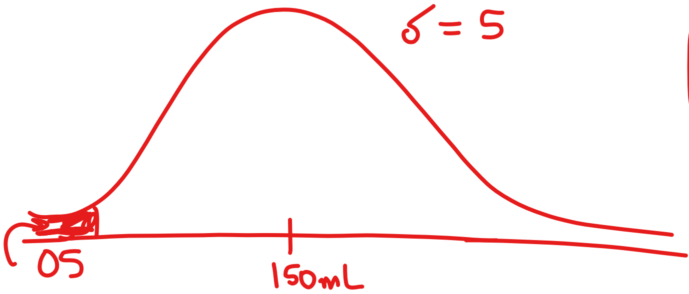
$(.6745)3 + 15 = x$

$x = 17\ 0$

$.6745.. = \frac{X - 15}{3}$

14. Cartons of juice are such that their volumes are normally distributed with a mean of 150 mL and a standard deviation of 5mL. 5% of cartons are rejected for containing too little juice. Find the minimum volume, to the nearest mL, that a carton must contain if it is to be accepted.

$\sigma = 5$




$\boxed{\text{min Volume} = 142\text{ mL}}$

15. Sacks of potatoes with mean weight 5 kg are packed by an automatic loader. In a test it was found that 10% of bags were over 5.2 kg. Use this information to find the standard deviation of the process.

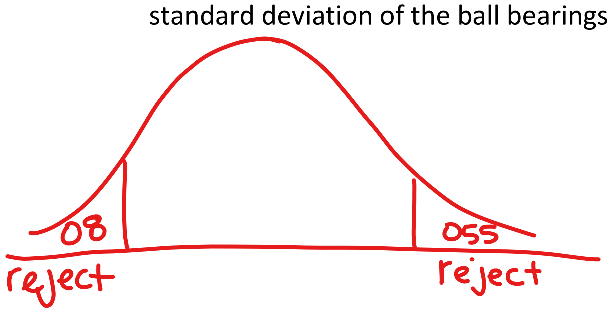
$Z = \frac{X-\mu}{\sigma}$ $\quad Z \sim N(0,1)$ $\quad 1\,282 = \frac{.2}{\sigma}$

$Z = \frac{5\,2-5}{\sigma}$ $\quad P\left(Z > \frac{2}{\sigma}\right) = 10$ $\quad \sigma = \frac{.2}{1282}$

$Z = \frac{.2}{\sigma}$ $\quad$ so $P\left(Z < \frac{2}{\sigma}\right) = 90$ $\quad \sigma = 156$

16. A manufacturer does not know the mean and standard deviation of the diameters of ball bearings she is producing. However a sieving system rejects all ball bearings larger than 2.4 cm and those under 1.8 cm in diameter. It is found that 8% are rejected as too small and 5.5% are rejected as too big. What is the mean and standard deviation of the ball bearings produced?

$Z > \frac{2\,4-\mu}{\sigma}$ $\quad Z < \frac{1\,8-\mu}{\sigma}$




$P\left(Z > \frac{2\,4-\mu}{\sigma}\right) = 055$ $\quad P\left(Z < \frac{1\,8-\mu}{\sigma}\right) = 08$

$\frac{2\,4-\mu}{\sigma} = 1.598$ $\quad \frac{1\,8-\mu}{\sigma} = -1\,405$

$\frac{2.4-\mu}{1\,598} = \sigma$ $\quad \frac{1\,8-\mu}{-1\,405} = \sigma$

$\boxed{\mu = 2.08 \quad \sigma = .200}$