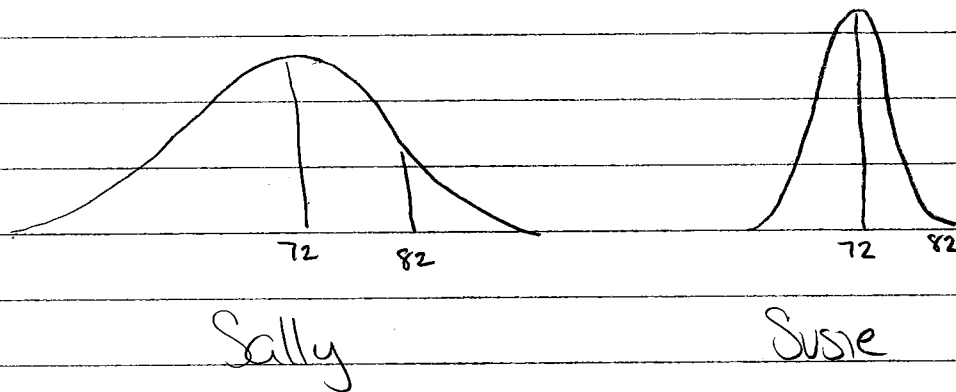


7.2 z Scores and Raw Scores

Sally and Susie both scored an 82% on a test, but Susie did not do as well as Sally in relation to the rest of her class (smaller standard deviation of scores in Susie's class)

z-value (z-score) - number of standard deviations measurement x is from the mean

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

z scores above the mean are > 0

z scores below the mean are < 0

when $x = \mu$ $z = 0$

z is measured in standard units

Example 1 First Watch requires an average of 1oz of cheese for every omelette with a standard deviation of .2 oz. If a cook utilizes more or less than 3 SD of cheese, they will be released from their position.

(A) Determine the z-score for each cook and if they will keep their job.

$$\text{Bob } 1.4 \text{ oz}$$

$$z = \frac{1.4 - 1}{.2}$$

$$z = 2$$

$$\text{Betty } .5 \text{ oz}$$

$$z = \frac{.5 - 1}{.2}$$

$$z = -2.5$$

Both keep their jobs

(B) If Bobby had a z score of 3.2, how much cheese did he use? Will he be fired?

$$3.2 = \frac{x - 1}{.2}$$

$$.64 = x - 1$$

$$1.64 = x$$

$$1.64 \text{ oz}$$

Fired!

Simplifying for x $x = z\sigma + \mu$

Raw Score - score given in the original measuring units.

$$\text{Raw score for Bobby} = 1.64 \text{ oz}$$

Table 4 Appendix Areas of a standard normal distribution (left-tail style)

7.2 cont'd

Use of the table

1. Areas to the left of z are provided
2. Areas to the right, subtract from 1
(or use the area for $-z$)
3. For areas between z_2 and z_1 , where $z_2 > z_1$,
area $z_2 - \text{area } z_1$

* Areas of outliers beyond $\pm 3.49 = 0$

Example 2 Sketch the area and find the area under the curve given the z values

(A) left of -1.32

$$\boxed{.0934}$$

(B) right of 2.46

$$1 - .9934 = \boxed{.0066}$$

(C) between 2.01 and $-.06$

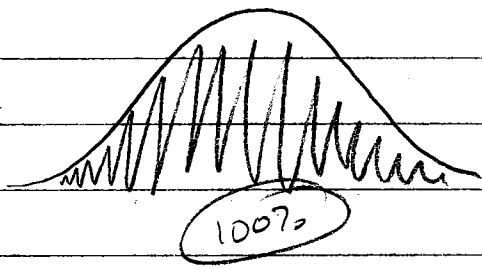
$$.9778 - .4761 = \boxed{.5017}$$

Example 3 Let z be a random variable with a standard normal distribution. Find the indicated probability.

$$(A) P(z \leq -2.15) = \underline{.0158} = \boxed{1.58\%}$$

$$(B) P(z \geq -1.50) = \underline{.9332} = \boxed{93.32\%}$$

$$(C) P(-2.37 \leq z \leq 0) = .5 - .0089 = \underline{.4911} = \boxed{49.11\%}$$



$$A = 1$$