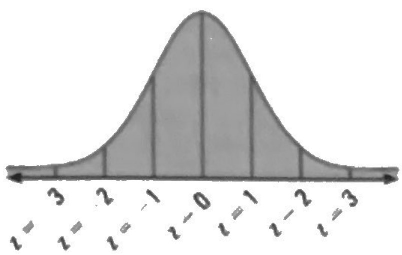
STANDARD NORMAL TABLE Notes

Standard Normal Distribution is the normal distribution with mean 0 and standard deviation 1.

The formula below can be used to transform x-values from a normal distribution with mean $\bar{x}$ and standard deviation σ into z-values having a standard normal distribution.



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

← mean

↖ standard deviation

The z-value for a particular x-value is called the **z-score** for the x-value and is the number of standard deviations the x-value lies above or below the mean.

Why are z-scores used? tell us the probability of a specific score that isn't a specific number of standard deviations from the mean

Standard Normal Table

If z is a randomly selected value from a standard normal distribution, you can use the table below to find the probability that z is less than or equal to some given value.

decimal

whole (one's)

$\le$

Standard Normal Table										
z	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
−3	.0013	.0010	.0007	.0005	.0003	.0002	.0002	.0001	.0001	.0000+
−2	.0228	.0179	.0139	.0107	.0082	.0062	.0047	.0035	.0026	.0019
−1	.1587	.1357	.1151	.0968	.0808	.0668	.0548	.0446	.0359	.0287
−0	.5000	.4602	.4207	.3821	.3446	.3085	.2743	.2420	.2119	.1841
0	.5000	.5398	.5793	.6179	.6554	.6915	.7257	.7580	.7881	.8159
1	.8413	.8643	.8849	.9032	.9192	.9332	.9452	.9554	.9641	.9713
2	.9772	.9821	.9861	.9893	.9918	.9938	.9953	.9965	.9974	.9981
3	.9987	.9990	.9993	.9995	.9997	.9998	.9998	.9999	.9999	1.0000−

Example 3

Use the Standard Normal Table to determine the following:

Probability that $x \le 3.5$

a. $P(x \le 3.5)$

$\boxed{.9998}$

99.98%

b. $P(x \le -0.7)$

$\boxed{.2420}$

24.20%

c. $P(x > 1.2)$

$P(x \le 1.2) = .8849$

$= \boxed{0.1151}$

What is the z-score for:

d. .1357

$\boxed{-1.1}$

e. .0047

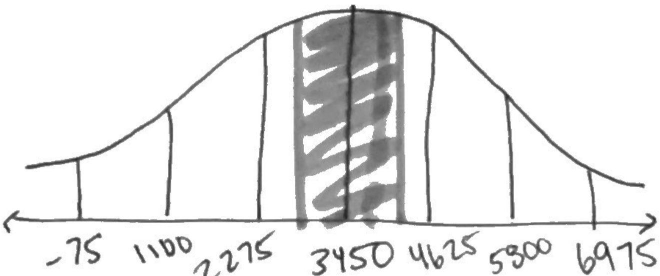
$\boxed{-2.6}$

f. .8849

$\boxed{1.2}$

Example 4

a. A survey of 20 colleges found that the mean credit card debt for seniors was \$3450. The debt was normally distributed with a standard deviation of \$1175. Find the probability that the credit card debt of the seniors was at most \$3600. Then, find the probability that the credit card debt was less than \$3800 but more than \$3000.



$z = \frac{3600 - 3450}{1175}$

$z = .127659...$

$z = 0.1$

$\boxed{.5398}$

$z = \frac{3800 - 3450}{1175}$ $\quad z = \frac{3000 - 3450}{1175}$

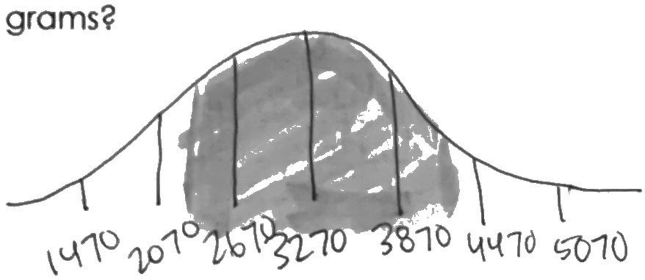
$z = 0.3$ $\quad z = -0.4$

0.6179 $\quad 0.3446$

$0.6179 - 0.3446$

$\boxed{0.2733}$

b. A study finds that the weights of infants at birth are normally distributed with a mean of 3270 grams and a standard deviation of 600 grams. An infant is randomly chosen. What is the probability that the infant weights less than 4170 grams but more than 2500 grams?



$z = \frac{4170 - 3270}{600}$ $\quad z = \frac{2500 - 3270}{600}$

$z = 1.5$ $\quad z = -1.3$

$0.9332 - 0.0968$

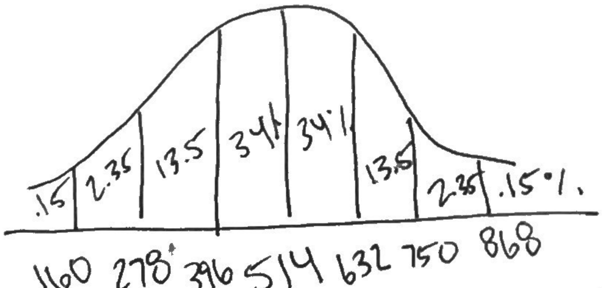
$= 0.8364$

Example 5

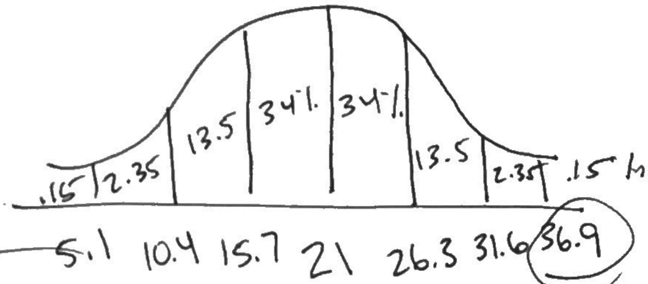
You take both the SAT and the ACT. You score 650 on the mathematics section on the SAT and 29 on the mathematics section of the ACT. The SAT test scores and the ACT test scores are each normally distributed. For the SAT, the mean is 514 and the standard deviation is 118. For the ACT, the mean is 21.0 and the standard deviation is 5.3

a) What percentile is your SAT math score? $P(x \le 650)$
b) What percentile is your ACT math score? $P(x \le 29)$
c) On which test did you perform better? Explain your reasoning.

SAT



ACT



$z = \frac{650 - 514}{118}$

$z = 1.2$

0.8849

you did better on the ACT

$z = \frac{29 - 21}{5.3}$

$z = 1.5$

$\boxed{0.9332}$