

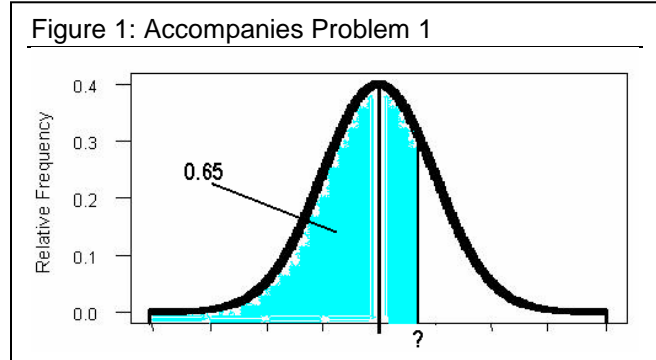
Reverse Normal Distribution Solutions

For problems 1 through 3 let z be distributed as a standard normal variable:

- 1) What is the z -score that marks the 65th percentile of the standard normal distribution?

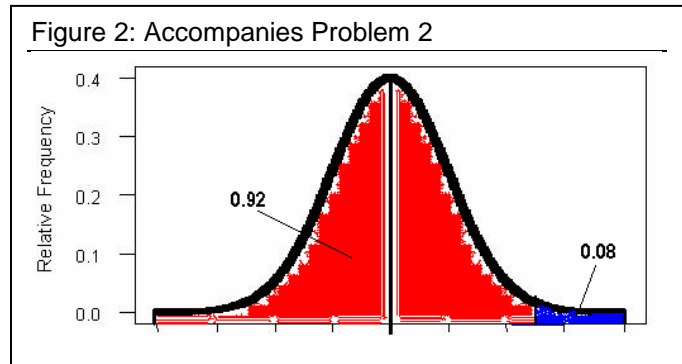
The left tail area is 65% or 0.65. Look this value up in the z -table to get your z -score.

$$Z = 0.38 \text{ or } 0.39$$



- 2) What is the z -score that marks the top 8% of the standard normal distribution?

In order to answer this question you need to find the left tail area. Since we know that the right tail area is 8% and that there is 100% under the normal density curve, the left tail area is $100 - 8 = 92\%$. Look up 0.92 in the body of Table A and find z to be 1.40 or 1.41



- 3) Find a value ' a ' such that $\Pr\{z \geq a\} = 0.8238$?

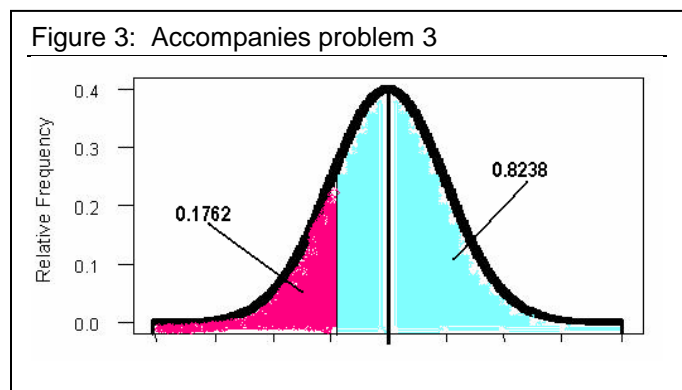
Start in the right hand tail and move into the distribution until you've accounted for 82.38% of the area. You'll need to go to the left of the mean (why?).

Now find the left tail area by subtracting 0.8238 from 1.

$$\text{Left tail} = 1 - 0.8238 = 0.1762$$

Now look 0.1762 up in the z -table to get the z -score.

$$Z = -0.93$$



Reverse Normal Distribution Solutions

Use the information in the following setting to answer questions 4 and 5:

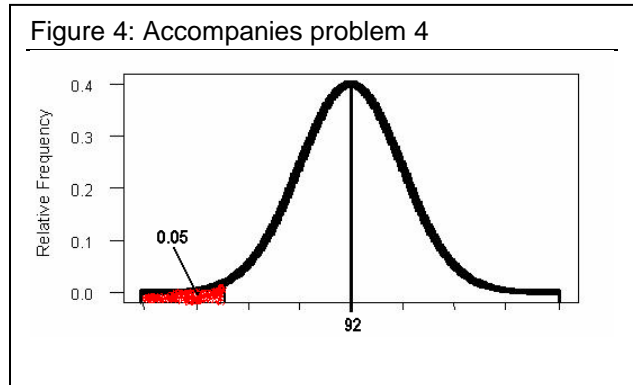
An important characteristic of woven fabric is the tensile strength of the threads used to produce the fabric. Let's say that a polypropylene manufacturing process produces rolls of fabric with an average tensile strength of 92 pounds per square inch (psi) with a standard deviation of 4 psi. Assume also that the distribution of this variable is normal.

- 4) Rolls of fabric in the weakest 5% of the population are discarded. What is the minimum strength a roll of fabric can have so that it is not discarded?

We will eventually be using the relation: $x = \mu + z\sigma$ so we need to know z . Everything else on the right hand side is given.

Go to Table A and find that $z = -1.65$

So now it's plug-N-chug:
 $x = 92 - 1.65(4) = 85.4$ psi



- 5) Rolls whose strength tests in the top 10% are sold at a premium. What is the minimum strength a roll can have in order to command a premium price?

An upper tail area of 10% corresponds to a lower tail area of 90%.

Go to the z-table and look up 0.90 to find the corresponding z-score.

$Z=1.28$

Now use the formula from problem 4 to find the strength that is required in order for a fabric to be in the top 10%

$x = 92 + 1.28(4) = 97.12$ psi

