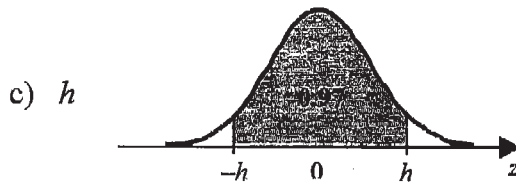
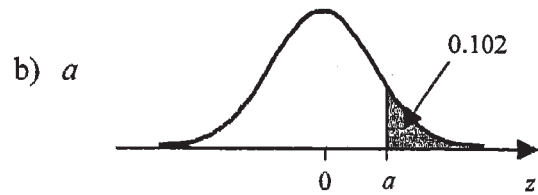
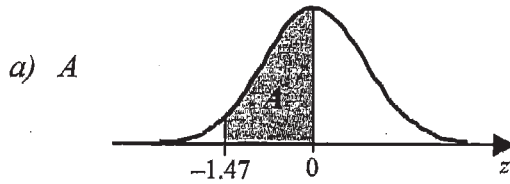


Problems for You to Do (Sections 6.2 – 6.4)

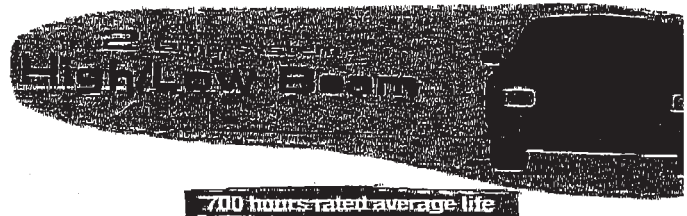
1. For the standard normal probability distributions drawn to the right, find the value of



2. For a z -score population that is normally distributed with a mean of 0 and a standard deviation of 1, what is the probability that you get a z -score
- less than 1.55?
 - between -2.5 and -1.75 ?

3. What is the 65th percentile of the standard normal distribution?

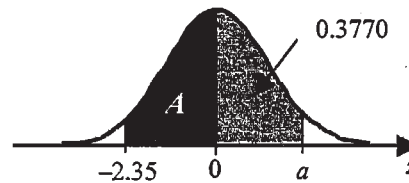
4. Suppose the lifetimes of headlights of this brand are normally distributed with a mean of 700 hours and a standard deviation of 50 hours.



- What proportion of the headlights have lifetimes that are
 - between 675 and 710 hours?
 - at least 780 hours?
- 70% of the headlights last longer than how many hours?

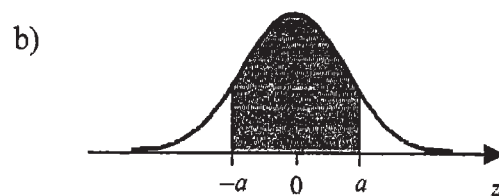
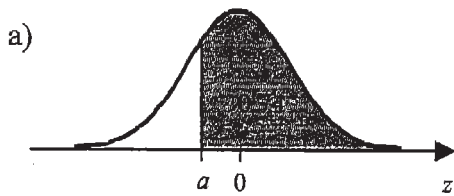
5. Suppose that pregnancy lengths are normally distributed with a mean of 266 days and a standard deviation of 7 days.
- What is the probability that a pregnancy lasts at least 260 days?
 - 80% of the pregnancies last longer than how many days?
 - What is the probability that a baby is born sometime during the 266th day after conception? (Assume that the normal is centred at the *start* of the 266th day.)
 - If a woman has 4 children and if the lengths of her pregnancies are independent of each other, what is the probability that exactly 3 of her 4 pregnancies were less than 273 days?

6. For a standard normal (z-score) distribution, find the probability of getting a z-score:
- | | |
|--------------------------|-------------------------|
| a) between 0 and 1.25 | b) less than 1.98 |
| c) not more than -0.65 | d) between 1.2 and 2.22 |
| e) at least -2.05 | f) at most 0.24 |
| g) more than -0.73 | h) not less than 1.16 |
7. Determine the z-score that has 5% of the area under the normal curve to its right.
8. In a study of job training at a small business college, the times required to learn how to use a word processor are found to be normally distributed with a mean of 462.1 minutes and a standard deviation of 76.3 min.
- a) What is the probability that one trainee, selected at random, will learn the processor in less than 8 hours?
- b) If a local company routinely hires the best 25% of trainees (based on speed in learning the processor), what is the cut-off learning time for this group?
9. For the standard normal probability distribution drawn to the right find the value of



- a) A
- b) a
10. The weights of B.C. Hothouse Better Boy tomatoes are normally distributed with a mean of 105 grams and a standard deviation of 11 grams.
- a) What is the probability that a randomly picked tomato
- weighs between 90 and 110 grams?
 - is heavier than 120 grams?
- b) The lightest 20% of the tomatoes weigh less than how many grams?
11. For the standard normal distribution find
- | | |
|-------------------------------------|-------------------------------------|
| a) the 99 th percentile. | b) the 30 th percentile. |
| c) P_{95} | d) P_{90} |
12. Assume that the weights of cardboard bales at the recycling depot are normally distributed with mean 90 kg and standard deviation 8 kg. What fraction of the bales is
- | | |
|--|---------------------------|
| a) at most 80 kg? | b) between 86 and 110 kg? |
| c) within 2 kg of the mean weight? | |
| d) more than one and a half SD's away from the mean? | |

13. For the standard normal probability distribution shown, what probability (area) would you have to look up in the standard normal table given in your class notes to allow you to determine the value of a ?



14. What is the third quartile of the standard normal distribution? (2-decimal accuracy)

15. Thanksgiving turkeys have weights that are normally distributed with a mean of 7 kg and a standard deviation of 2.5 kg.

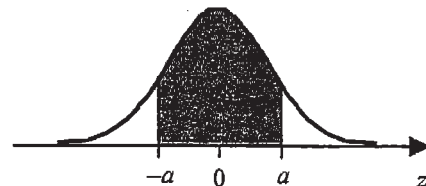
- What *percentage* of the turkeys weighs at least 4 kg? (2 decimals)
- What *percentage* of the turkeys weighs between 6 and 8 kg? (2 decimals)
- What proportion of the turkeys weighs no more than 12 kg?
- 20% of the turkeys weigh at least how many kg? (2 decimals)
- The lightest 10% of the turkeys weigh at most how many kg? (2 decimals)

16. For a z -score population that is normally distributed with a mean of 0 and a standard deviation of 1, express the following probabilities in proper symbolic form, and then evaluate the probability of getting a z -score

- between -1.25 and 0.5 ?
- less than 1.5 ?
- greater than 2.25 ?

For each one shade in the probability on a sketch.

17. For the standard normal probability distribution drawn to the right what is the value of a ?



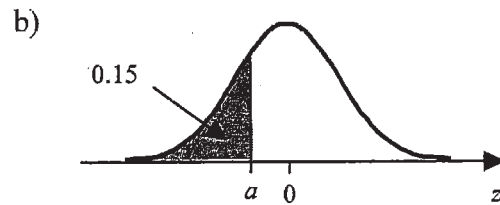
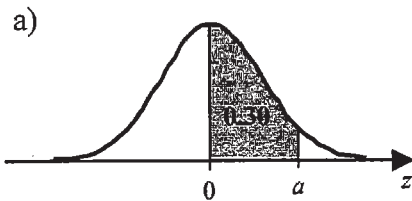
18. Find the 35th percentile of IQ test scores that are normally distributed with a mean of 100 and an SD of 15.

19. Assume that the weights of Halloween jack-o-lanterns are normally distributed with a mean of 8 kg and a standard deviation of 2 kg.

- What proportion of the jack-o-lanterns has weights
 - that are at least 5 kg?
 - that are within 1 kg of the mean?
- The heaviest 1% of the jack-o-lanterns weigh more than how many kg?

20. Express each probability in proper symbolic form, then use your TI calculator to evaluate. Round off your answers to 4 decimal places. For a standard normal distribution, find the probability of getting a z -score
- | | |
|--------------------------|---|
| a) less than 1.76 | b) more than half an SD greater than the mean |
| c) of at least 0.4 | d) within a third of an SD of the mean |
| e) not more than -0.75 | f) not between -1 and 2 |

21. For the standard normal probability distribution shown, determine the value of a to 4 decimal places.



22. The diameters of the base of all trees (logs) harvested by a logging company were found to be normally distributed with a mean of 62 cm and a standard deviation of 8 cm.
- If you sample a log at random, what is the probability that its diameter will be within 4 cm of the average diameter of all logs?
 - A log is considered to be superior if the base diameter is over 75 cm. What percent of logs harvested will be considered superior?
 - If you randomly sample 8 logs, find the probability that all of their diameters will be within 2 cm of the population mean?
23. IQ scores are normally distributed with a mean of 100 and a standard deviation of 15. Mensa is an organization for people with high IQs, and eligibility requires an IQ above 131.5.
- If someone is randomly selected, what is the probability that he or she will meet the Mensa requirement?
 - In a typical region of 85,000 people, how many are eligible for Mensa?
 - If we define a "genius" as someone in the top 1% of the IQ scores, find the IQ score separating geniuses from the rest of the population.

24. a) Lengths of pregnancies are normally distributed with a mean 268 days and a standard deviation of 15 days. If we define a baby as "premature" if it is born at least 3 weeks early, what percentage of babies is born prematurely?
- b) If we redefine "premature" as a baby whose pregnancy length is in the lowest 4%, find the pregnancy length that separates premature babies from those that are not premature.
25. a) Quarters have weights that are normally distributed with a mean of 5.67g and a standard deviation of 0.070g. If a vending machine is adjusted to reject quarters weighing less than 5.50g or more than 5.80g, what percentage of legal quarters is rejected?
- b) Find the weights of accepted legal quarters if the machine is readjusted so that the lightest 1.5% and the heaviest 1.5% are rejected.
26. "Long-life" light bulbs have lifetimes that are normally distributed with a mean of 800 hours and a standard deviation of 145 hours.
- a) 85% of the light bulbs last at least how long?
- b) 10% of the light bulbs fail before what time?