4. What happens to the value of the independent-measures t statistic as the difference between the two sample means increases? What happens to the t value as the variability of the scores in the two samples increases?

10. A psychologist would like to examine the effects of fatigue on mental alertness. An attention test is prepared that requires subjects to sit in front of a blank TV screen and press a response button each time a dot appears on the screen. A total of 110 dots is presented during a 90-minute period, and the psychologist records the number of errors for each subject. Two groups of subjects are selected. The first group of subjects ($n = 5$) is tested after they have been kept awake for 24 hours. The second group ($n = 10$) is tested in the morning after a full night's sleep. The data for these two samples are as follows:

AWAKE 24 HOURS	RESTED
$\overline{X} = 35$	$\overline{X} = 24$
$SS = 120$	$SS = 270$

On the basis of these data, can the psychologist conclude that fatigue significantly increases errors on an attention task? Use a one-tailed test with $\alpha = .05$.

16. A researcher would like to measure the effects of air pollution on life expectancy. Two samples of newborn rats are selected. The first sample of 10 rats is housed in cages where the atmosphere is equivalent to the air in a severely polluted city. The second sample of $n = 20$ is placed in cages with clean air. The average life span for the first group is $\overline{X} = 478$ days with $SS = 5020$ and for the second group $\overline{X} = 511$ with $SS = 10,100$. Does pollution cause a difference in life expectancy? Test with $\alpha = .01$.

17. Siegel (1990) found that elderly people who owned dogs were less likely to pay visits to their doctors after upsetting events than those who did not own pets. Similarly, consider the following hypothetical data. A sample of elderly dog owners is compared to a similar group (in terms of age and health) who do not own dogs. The researcher records the number of visits to the doctor during the past year for each person. For the following data, is there a significant difference in the number of doctor visits between dog owners and control subjects? Use the .05 level of significance.

CONTROL GROUP	DOG OWNERS
12	8
10	5
6	9
9	4
15	6
12	
14	

18. In a classic study examining the effects of environment on development, Kretch and his colleagues (1962) divided a sample of infant rats into two groups. One group was housed for a *stimulus-rich* environment containing ladders, platforms, tunnels, and colorful decorations. The second group was housed in *stimulus-poor* conditions consisting of plain grey cages. At maturity, maze-learning performance was measured for all the rats. The following hypothetical data simulate Kretch's results. Each score indicates the number of errors committed by a rat before it successfully solved the maze:

rich rats: 18 24 27 23 31 29 20 33 25 30

poor rats: 37 27 26 31 35 43 40 36 28 39

Do these data indicate a significant difference between the two groups? Test at the .01 level of significance.