suggested problems ch11

Refer to the data in Table 3.11 (on p. 69). Another method for relating measures of reactivity for the automated and manual blood pressures is the correlation coefficient. Suppose the correlation coefficient relating these two measures of reactivity is .19, based on 79 people having reactivity measured by each type of blood-pressure monitor.

TABLE 3.11 **Classification of cardiovascular reactivity using an automated and a manual sphygmomanometer**

	ΔDBP, manual	
ΔDBP, automated	<10	≥10
<10	51	7
≥10	15	6

11.31 What is the appropriate procedure to test if there is a relationship between reactivity as measured by the automated and manual monitors?

11.32 Conduct the test procedure in Problem 11.31, and report a *p*-value. What do the results mean, in words?

11.33 Provide a 95% confidence interval for the correlation coefficient between these two measures of reactivity.

11.31 We test the hypothesis $H_0: \rho = 0$ vs $H_1: \rho \neq 0$, where ρ = true correlation between reactivity as measured by the automated and manual monitors. We use the one-sample t test for correlation coefficients.

11.32 The test statistic is

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} = \frac{.19\sqrt{77}}{\sqrt{1-.19^2}} = \frac{1.667}{0.982} = 1.70 \sim t_{77} \text{ under } H_0$$

Since $t_{60,.95} = 1.671 < 1.70 < t_{60,.975} = 2.000$ and $t_{120,.95} = 1.658 < 1.70 < t_{120,.975} = 1.980$, it follows that if we had either 60 or 120 df, then $2 \times (1-.975) < p < 2 \times (1-.95)$ or $.05 < p < .10$. Thus, there is a trend toward statistical significance; persons with greater changes in blood pressure as measured by the manual monitor tend to have higher changes as measured by the automated monitor. However, the relationship is weak and the significance level only borderline ($.05 < p < .10$).

11.33 A 95% CI for z (the Fisher's z transform of ρ) is given by z_1, z_2, where

$$z_1 = \hat{z} - 1.96\sqrt{\frac{1}{n-3}}$$

$$z_2 = \hat{z} + 1.96\sqrt{\frac{1}{n-3}}$$

From Table 13, Appendix, text, we have that for $r = .19$, the z transform = 0.192. Therefore,

$$z_1 = 0.192 - 1.96\sqrt{\frac{1}{76}} = 0.192 - 0.225 = -0.032$$

$$z_2 = 0.192 + 0.225 = 0.417$$

The 95% CI for ρ is given by ρ_1, ρ_2, where

$$\rho_1 = \frac{\exp(2z_1)-1}{\exp(2z_1)+1} = \frac{\exp(-2\times 0.032)-1}{\exp(-2\times 0.032)+1} = \frac{-0.062}{1.938} = -0.032$$

$$\rho_2 = \frac{\exp(2z_2)-1}{\exp(2z_2)+1} = \frac{\exp(2\times 0.42)-1}{\exp(-2\times 0.42)+1} = \frac{1.316}{3.302} = 0.394$$

The 95% CI for $\rho = (-0.032, 0.394)$