5.14 This would be paired data, as the cities contributing air quality measurements in 2013 are the same as the ones in 2014. Ours would be a paired test.

5.22 This is matched-pairs data. There is no need to subtract values of healthy subjects from their match among cancer subjects; at the point where we enter the problem we know there are $n = 127$ such differences, with

sample mean $\bar{d} = 2.7$ and sample std. dev. $s_d = 15.9$.

(a) We test $H_0: \mu_d = 0$ vs. $H_a: \mu_d \neq 0$. Our test statistic is

$$t = \frac{\bar{d}}{s_d/\sqrt{n}} = \frac{2.7}{15.9/\sqrt{127}} \doteq 1.914$$

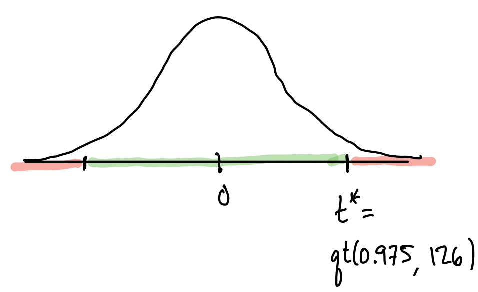
The P-value comes from

$$2*(1 - pt(1.914, 126)) = 0.0578$$

We fail to reject H_0 at the 5% level.

(b) One might construct a 95% CI, but the simpler approach is to note that, since our test statistic was in the nonrejection region corresponding to $\alpha = 0.05$ w/ df $= 126$, 0 is in the 95% CI. (The nonrejection region is all t-scores between $-t^*$ and t^*, where $t^* = qt(0.975, 126)$.)

t dist, df = 126



5.26 (a) Let μ_M, μ_F denote mean egg sizes for male, female chicks, respectively. Our hypotheses are $H_0: \mu_M - \mu_F = 0$ vs. $H_a: \mu_M - \mu_F \neq 0$. The test statistic:

$$t = \frac{1619.95 - 1584.2}{\sqrt{\frac{127.54^2}{80} + \frac{102.51^2}{48}}} = \frac{35.75}{20.549} \doteq 1.74$$

$2*(1 - pt(1.74, 47)) = 0.088$ (P-value), so we fail to reject H_0.

(b) $$\bar{x}_F - \bar{x}_D \pm qt(0.975, 41) * SE_{\bar{x}_F - \bar{x}_D} = 1606.91 - 1605.87 \pm (2.0195)\sqrt{\frac{126.32^2}{89} + \frac{103.46^2}{42}}$$

$$\approx 1.04 \pm 42.079$$

or $(-41.039, 43.119)$