Stat 21 Test 2 Correction

P1. correct answer is (a) and (d)

P5(b) Lifespan $= -3.2656(2.5) - 23.4392 + 93.6813$

P6.(b) We can perform ANOVA F-test

$H_0: \beta_1 = \beta_2 = \beta_3$ in which β_1 is the coefficient for weight, β_2 is the
$H_A:$ not H_0 coefficient for transmission type M, and β_3 is the
       coefficient for weight: transmission type M.

p-value is $1.669e^{-12}$, which is less than 0.05, so at $\alpha = 0.05$,
we reject the null hypothesis in favor of the alternative hypothesis.
We conclude that at least one of the predictor terms in this
model significantly contributes to predicting the life expectancy.

P7(a) Nested F-test.

$H_0: \beta_2 = \beta_3 = 0$ in which β_2 is the coefficient for transmission type M,
       and β_3 is the coefficient for weight: transmission type M.
$H_A:$ not H_0, at least one of β_2 or β_3 is not equal to 0.

P7(b) ~~if you see only model 3 residuals~~
~~a looks at model 1 and 3, but model 1 has an issue of funneling/ curvature.~~
~~therefor 6 b has a higher reliability.~~

~~Reliability: assumption are met?~~

~~You have to look at sum square of model 1, so it's less reliable.~~

solution to problem 7(b) on the next page

7(b) ANOVA F-test on 6b is more reliable than Nested F-test in 7(a) because ANOVA had more assumptions met relative to nested F-test. In ANOVA, you only have to look at model 3 residual plot, which contains residuals of full model. The residual plot shows point scattered with roughly equal spread and no non-random pattern, so linearity and constant spread assumption is met. However, for nested F-test, you need to consider sum square of residuals in both the reduced and full model, so this test requires considering residual plot of model 1 (reduced) and model 3 (full). Residual plot in model 1 shows concaving trend of residuals, therefore, nested F-test in 7(a) violates the linearity assumption.

Data used for both model 1 and 3 is collected in the same fassion, so both ANOVA and Nested F-test should have assumption met eo same degree, except that Nested F-test violates linearity assumption, and ANOVA donot, therefore, ANOVA is more reliable than Nested F-test.