**ChE 320\_Spr\_17\_HW 7 Grading Rubric**

**Total: 100 pts.**(Please do not cut point more than once for the same mistake, e.g. If there are 3 parts in a question, answer was calculated wrong in the 1st part. But the method was correct for the 2nd and 3rd part; give student the points of 2nd and 3rd part*. If applicable, credits for the answers are also given for using correct units*)

**4- 58 (20 pts)**



The normality assumption appears to be satisfied because the data fall along a straight line.

a) 1) The parameter of interest is the true mean level of polyunsaturated fatty acid, μ.

2) H0: μ = 17

3) H1: μ ≠ 17

4) Test statistic is t0 = 

5) Reject H0  if t0 > tα/2,n-1  where t0.025,5 = 2.571

6) = 16.98 s = 0.319 n = 6

t0 = 

7) P-value = 2P(t > 0.154): for degrees of freedom of 5 we obtain 2(0.40) < P-value = 0.80 < P-value. Because the P-value is greater than 0.05, we fail to reject the null hypothesis. *+6 for correct method, +2 for answer*

b) Using the OC curves on Chart v (b), with d = 1.567, when β ≅ 0.1, n = 10. Therefore, the current sample size of 6 is not adequate. *+4 for correct answer*

c) For α = 0.01, tα/2,n-1 = t0.005,5 = 4.032





16.455 ≤ μ ≤ 17.505

With 99% confidence, the true mean level of polyunsaturated fatty acid is between 16.455% and 17.505%.

*+6 for correct method, +2 for answer*

**4- 66 (20 pts)**

a) P-value = P(> 22.35): for degrees of freedom of 14 we obtain 0.05 < P-value < 0.1 *+5 for correct answer*

b) P-value = P(> 23.50): for degrees of freedom of 14 we obtain 0.05 < P-value < 0.1 *+5 for correct answer*

c) P-value = P(> 25.00): for degrees of freedom of 14 we obtain 0.025 < P-value < 0.05 *+5 for correct answer*

d) P-value = P(> 28.55): for degrees of freedom of 14 we obtain 0.01 < P-value < 0.025 *+5 for correct answer*

**4- 70 (20 pts)**

a) In order to use χ2 statistic in hypothesis testing and confidence interval construction we need to assume that the underlying distribution is normal.

1) The parameter of interest is the true standard deviation of Izod strength, σ. However, the answer can be found from a hypothesis test on σ2.

2) H0: σ2 = 0.1

3) H1: σ2 ≠ 0.1

4) = 

5) Reject H0 if where  6.84 or where 38.58

6) n = 20, s = 0.328

= 

7) Because 6.84 < 20.441 < 38.58 we fail to reject H0. There is not sufficient evidence to conclude that the true variance of Izod strength is differs from 0.10 ft-lb/in at α = 0.01. *+4 for correct method, +2 for answer*

b) P-value = 2P(χ2 > 20.441) for 19 degrees of freedom: 0.20 < 2P(χ2 > 20.441) < 1 *+4 for correct answer*

c) 99% confidence interval for σ2 :

For α = 0.01 and n = 20,38.58 and6.84



0.053 ≤ σ2 ≤ 0.299

With 99% confidence, the true variance of Izod strength is between 0.053 (ft-lb/in)2 and 0.299

(ft-lb/in)2.  *+4 for correct method, +2 for answer*

d) Because the hypothesized value falls within this confident interval, we fail to reject the null hypothesis. *+4 for correct answer*

**4- 105 (20 pts)**

Symmetric confidence interval: , because z0.025 = 1.96

The length of this interval is  *+4 for correct method, +2 for answer*

Asymmetric confidence interval: , because −z0.01 = −2.325 and z0.04 = 1.75

The length of this interval is   *+4 for correct method, +2 for answer*

The symmetric confidence interval is the narrower of the two. *+4 for correct answer*

An advantage of a symmetric confidence interval is that in general it is narrower than an asymmetric confidence interval.

*+4 for correct answer*

**4- 136 (20 pts)**

a) H0: μ = 5000, H1: μ > 5000 Upper-tailed *+5 for correct answer*

b) H0: μ = 60,000, H1: μ > 60,000 Upper-tailed *+5 for correct answer*

c) H0: σ = 2, H1: σ < 2, Lower-tailed *+5 for correct answer*

**(g)** H0: σ2 = 0.05, H1: σ2 < 0.05, Lower-tailed *+5 for correct answer*