IA 4

50 Points (each question is 5 points)

1. Describe the three (3) cases that compare Specification Limits to Control Limits.  
    If the 6 sigma spread of the individuals is less than the spread of the specification limits then the process is capable of meeting the specification.

If the 6 sigma spread of the individuals is equal to the spread of the specification limits then there is no variation in the process, so the product is capable of meeting the specification.

If the 6 sigma spread of the individuals is greater than the spread of the specification limits, then there is a variation in the process and the product is not capable of meeting the specification.

1. Given Xbar = 50.2, USL = 50.5, LSL = 49.5, Rbar = 0.68, n = 4, calculate
2. Cp

Sigma=Rbar/d2 = 0.68/2.059 = 0.33

Cp= (USL-LSL)/6sigma = (50.5-49.5)/(6\*0.33) = 0.51

1. Cpk

Cpk = Min {(50.5-50.2) or (50.2-49.5)} / 3sigma

Cpk= Min {(0.3) or (0.7)}/(3\*0.33)

Cpk= 0.3/0.99 = 0.30

Interpret the results.

The results show that the process is not capable of meeting the specification.

1. Universal Commodities, Inc. builds a product with an upper tolerance limit of 102.5 units and a lower tolerance limit of 97.5 units. The process mean is 100.4 units which is equal to the nominal design specification. Both the Xbar and R charts show control and the sample size is 4.

Compute

1. the process standard deviation, σ

sigma=1.915/2.59=0.93

and (ii) Cp,

Cp=(102.5-97.5)/(6\*0.93)

Cp=0.896

assuming Rbar is 1.915.

1. Hotels use statistical information and control charts to track their performance on a variety of indicators. Recently a hotel manager has been asked whether his team is capable of maintaining scores between 8 and 10 (on a scale of 1 to 10) for “overall cleanliness of room”. The most recent data have a mean of 8.624, a standard deviation of 1.446, and n = 10. Calculate:
2. Cp

Cp=(10-8)/(6\*1.446)=0.23

1. Cpk

Cpk= Min {(10-8.624) or (8.624-8)} / (3\*1.446)

Cpk= Min{(1.376)or(0.624)}/(4.338)=0.14

Interpret the indices.

The results show that the process is not capable of meeting the specification.

1. The Tasty Morsels Chocolate Company tracks the amount of chocolate found in its chocolate bars. The target is 26 grams and the USL and LSL are 29 and 23 grams, respectively. If their most recent Xbar has a centerline of 25 and Rbar of 2, and n = 4, calculate:
2. Cp

Sigma=2/2.059=0.97

Cp=(29-23)/(6\*0.97)=1.03

1. Cpk

Cpk= Min {(29-25) or (25-23)} / (3\*0.97)

Cpk=Min{(4)or(2)}/(2.91)

Cpk=2/2.91=0.69

Determine if the process is capable.

The results show that the process is capable of meeting the specification.