

.

**Escuela Superior Politécnica del Litoral**

**Instituto de Ciencias Matemáticas**

**Ingeniería en Auditoria y Control de Gestión**

**Examen de tercera Evaluación**

**Ingeniería de la Calidad.**

**14 de septiembre del 2010**

**Nombre: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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1. ¿Cuál es la diferencia entre control de calidad y aseguramiento de la calidad?
2. Enumere los principios de calidad.
3. Describa el cículo de Deming
4. ¿Qué son los costes de calidad?
5. El diametro de un pin debe estar comprendido entre 31.8 y 32.3 mm. Se han muestreado 12 pins obteniendose los siguientes valores: 31.98, 31.85, 32.03, 32.05, 31.97, 31.88, 32.09, 32.07, 32.01, 31.98, 31.94, 31.97 (Media = 31.985, Sn-1 = 0.07192)

Estime la capacidad del proceso y el índice de capacidad del proceso.

1. Bosqueje un diagrama de Pareto a partir de la siguiente tabla



1. Elabore un diagrama de Ishikawa para determinar las posibles causas de la deserción estudiantil.
2. Que son y para que se usan las graficas de control.
3. La longitud de una determinada pieza debe estar comprendida entre 98 y 101.5 mm.

Cuando el proceso de fabricación está bajo control la longitud de esta pieza se distribuye según una normal N(99.8, 0.5) mm. Actualmente se está controlando el proceso mediante un gráfico X tomado 3 piezas cada 10 minutos. El proceso fabrica 1 pieza cada tres segundos.

1. Calcule el ATS para detectar un cambio en el proceso, cambiando la nueva media a 100.7 mm.
2. Porcentaje de defectuosas cuando el proceso está fuera de control.
3. Promedio de piezas defectuosas fabricadas hasta que se detecta esta salida de control.



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| **FACTORES PARA GRÁFICAS DE CONTROL** |
|  n  | Factor A2  | Factor D3  | Factor D4 | factor d2 |
| 2 | 1.880 | 0 | 3,267 | 1,128 |
| 3 | 1.023 | 0 | 2,574 | 1,693 |
| 4 | 0,729 | 0 | 2,282 | 2,059 |
| 5 | 0,577 | 0 | 2,114 | 2,326 |
| 6 | 0,483 | 0 | 2,004 | 2,534 |
| 7 | 0,419 | 0,076 | 1,924 | 2,704 |



|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Z** | **0.00**  | **0.01**  | **0.02**  | **0.03**  | **0.04**  | **0.05**  | **0.06**  | **0.07**  | **0.08**  | **0.09** |
| **0.0**  | 0.5000  | 0.5040  | 0.5080  | 0.5120  | 0.5160  | 0.5199  | 0.5239  | 0.5279  | 0.5319  | 0.5359 |
| **0.1**  | 0.5398  | 0.5438  | 0.5478  | 0.5517  | 0.5557  | 0.5596  | 0.5636  | 0.5675  | 0.5714  | 0.5753 |
| **0.2**  | 0.5793  | 0.5832  | 0.5871  | 0.5910  | 0.5948  | 0.5987  | 0.6026  | 0.6064  | 0.6103  | 0.6141 |
| **0.3**  | 0.6179  | 0.6217  | 0.6255  | 0.6293  | 0.6331  | 0.6368  | 0.6406  | 0.6443  | 0.6480  | 0.6517 |
| **0.4**  | 0.6554  | 0.6591  | 0.6628  | 0.6664  | 0.6700  | 0.6736  | 0.6772  | 0.6808  | 0.6844  | 0.6879 |
| **0.5**  | 0.6915  | 0.6950  | 0.6985  | 0.7019  | 0.7054  | 0.7088  | 0.7123  | 0.7157  | 0.7190  | 0.7224 |
| **0.6**  | 0.7257  | 0.7291  | 0.7324  | 0.7357  | 0.7389  | 0.7422  | 0.7454  | 0.7486  | 0.7517  | 0.7549 |
| **0.7**  | 0.7580  | 0.7611  | 0.7642  | 0.7673  | 0.7704  | 0.7734  | 0.7764  | 0.7794  | 0.7823  | 0.7852 |
| **0.8**  | 0.7881  | 0.7910  | 0.7939  | 0.7967  | 0.7995  | 0.8023  | 0.8051  | 0.8078  | 0.8106  | 0.8133 |
| **0.9**  | 0.8159  | 0.8186  | 0.8212  | 0.8238  | 0.8264  | 0.8289  | 0.8315  | 0.8340  | 0.8365  | 0.8389 |
| **1.0**  | 0.8413  | 0.8438  | 0.8461  | 0.8485  | 0.8508  | 0.8531  | 0.8554  | 0.8577  | 0.8599  | 0.8621 |
| **1.1**  | 0.8643  | 0.8665  | 0.8686  | 0.8708  | 0.8729  | 0.8749  | 0.8770  | 0.8790  | 0.8810  | 0.8830 |
| **1.2**  | 0.8849  | 0.8869  | 0.8888  | 0.8907  | 0.8925  | 0.8944  | 0.8962  | 0.8980  | 0.8997  | 0.9015 |
| **1.3**  | 0.9032  | 0.9049  | 0.9066  | 0.9082  | 0.9099  | 0.9115  | 0.9131  | 0.9147  | 0.9162  | 0.9177 |
| **1.4**  | 0.9192  | 0.9207  | 0.9222  | 0.9236  | 0.9251  | 0.9265  | 0.9279  | 0.9292  | 0.9306  | 0.9319 |
| **1.5**  | 0.9332  | 0.9345  | 0.9357  | 0.9370  | 0.9382  | 0.9394  | 0.9406  | 0.9418  | 0.9429  | 0.9441 |
| **1.6**  | 0.9452  | 0.9463  | 0.9474  | 0.9484  | 0.9495  | 0.9505  | 0.9515  | 0.9525  | 0.9535  | 0.9545 |
| **1.7**  | 0.9554  | 0.9564  | 0.9573  | 0.9582  | 0.9591  | 0.9599  | 0.9608  | 0.9616  | 0.9625  | 0.9633 |
| **1.8**  | 0.9641  | 0.9649  | 0.9656  | 0.9664  | 0.9671  | 0.9678  | 0.9686  | 0.9693  | 0.9699  | 0.9706 |
| **1.9**  | 0.9713  | 0.9719  | 0.9726  | 0.9732  | 0.9738  | 0.9744  | 0.9750  | 0.9756  | 0.9761  | 0.9767 |
| **2.0**  | 0.9772  | 0.9778  | 0.9783  | 0.9788  | 0.9793  | 0.9798  | 0.9803  | 0.9808  | 0.9812  | 0.9817 |
| **2.1**  | 0.9821  | 0.9826  | 0.9830  | 0.9834  | 0.9838  | 0.9842  | 0.9846  | 0.9850  | 0.9854  | 0.9857 |
| **2.2**  | 0.9861  | 0.9864  | 0.9868  | 0.9871  | 0.9875  | 0.9878  | 0.9881  | 0.9884  | 0.9887  | 0.9890 |
| **2.3**  | 0.9893  | 0.9896  | 0.9898  | 0.9901  | 0.9904  | 0.9906  | 0.9909  | 0.9911  | 0.9913  | 0.9916 |
| **2.4**  | 0.9918  | 0.9920  | 0.9922  | 0.9925  | 0.9927  | 0.9929  | 0.9931  | 0.9932  | 0.9934  | 0.9936 |
| **2.5**  | 0.9938  | 0.9940  | 0.9941  | 0.9943  | 0.9945  | 0.9946  | 0.9948  | 0.9949  | 0.9951  | 0.9952 |
| **2.6**  | 0.9953  | 0.9955  | 0.9956  | 0.9957  | 0.9959  | 0.9960  | 0.9961  | 0.9962  | 0.9963  | 0.9964 |
| **2.7**  | 0.9965  | 0.9966  | 0.9967  | 0.9968  | 0.9969  | 0.9970  | 0.9971  | 0.9972  | 0.9973  | 0.9974 |
| **2.8**  | 0.9974  | 0.9975  | 0.9976  | 0.9977  | 0.9977  | 0.9978  | 0.9979  | 0.9979  | 0.9980  | 0.9981 |
| **2.9**  | 0.9981  | 0.9982  | 0.9982  | 0.9983  | 0.9984  | 0.9984  | 0.9985  | 0.9985  | 0.9986  | 0.9986 |
| **3.0**  | 0.9987  | 0.9987  | 0.9987  | 0.9988  | 0.9988  | 0.9989  | 0.9989  | 0.9989  | 0.9990  | 0.9990 |
| **3.1**  | 0.9990  | 0.9991  | 0.9991  | 0.9991  | 0.9992  | 0.9992  | 0.9992  | 0.9992  | 0.9993  | 0.9993 |
| **3.2**  | 0.9993  | 0.9993  | 0.9994  | 0.9994  | 0.9994  | 0.9994  | 0.9994  | 0.9995  | 0.9995  | 0.9995 |
| **3.3**  | 0.9995  | 0.9995  | 0.9995  | 0.9996  | 0.9996  | 0.9996  | 0.9996  | 0.9996  | 0.9996  | 0.9997 |
| **3.4**  | 0.9997  | 0.9997  | 0.9997  | 0.9997  | 0.9997  | 0.9997  | 0.9997  | 0.9997  | 0.9997  | 0.9998 |
| **3.5**  | 0.9998  | 0.9998  | 0.9998  | 0.9998  | 0.9998  | 0.9998  | 0.9998  | 0.9998  | 0.9998  | 0.9998 |
| **3.6**  | 0.9998  | 0.9998  | 0.9999  | 0.9999  | 0.9999  | 0.9999  | 0.9999  | 0.9999  | 0.9999  | 0.9999 |
| **3.7**  | 0.9999  | 0.9999  | 0.9999  | 0.9999  | 0.9999  | 0.9999  | 0.9999  | 0.9999  | 0.9999  | 0.9999 |