**MGMT 511**

**Statistical Process Control**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TABLE 1 Original Green River Chemical Company data | | | | | | | | |
| **Date** |  | **1** | **2** | **3** | **4** | **5** | **X** | **R** |
| **March** | 2 | 57 | 54 | 62 | 45 | 36 | 50.8 | 26 |
|  | 3 | 56 | 54 | 47 | 42 | 62 | 52.2 | 20 |
|  | 4 | 40 | 70 | 58 | 45 | 44 | 51.4 | 30 |
|  | 5 | 52 | 58 | 40 | 52 | 46 | 49.6 | 18 |
|  | 6 | 57 | 42 | 52 | 58 | 59 | 53.6 | 17 |
|  | 9 | 62 | 49 | 42 | 33 | 55 | 48.2 | 29 |
|  | 10 | 40 | 39 | 49 | 59 | 48 | 47.0 | 20 |
|  | 11 | 64 | 50 | 42 | 57 | 50 | 52.6 | 22 |
|  | 12 | 58 | 53 | 52 | 48 | 50 | 52.2 | 10 |
|  | 13 | 60 | 50 | 41 | 41 | 50 | 48.4 | 19 |
|  | 16 | 52 | 47 | 48 | 58 | 40 | 49.0 | 18 |
|  | 17 | 55 | 40 | 56 | 49 | 45 | 49.0 | 16 |
|  | 18 | 47 | 48 | 50 | 50 | 48 | 48.6 | 3 |
|  | 19 | 50 | 50 | 49 | 51 | 51 | 50.2 | 2 |
|  | 20 | 51 | 50 | 51 | 51 | 62 | 53.0 | 12 |
|  | 23 | 51 | 50 | 49 | 50 | 50 | 50.0 | 2 |
|  | 24 | 45 | 47 | 70 | 46 | 36 | 48.8 | 34 |
|  | 25 | 50 | 35 | 48 | 39 | 47 | 43.8 | 15 |
|  | 26 | 55 | 70 | 50 | 30 | 51 | 51.2 | 40 |
|  | 27 | 49 | 38 | 64 | 36 | 47 | 46.8 | 28 |
|  | 30 | 59 | 62 | 40 | 54 | 64 | 55.8 | 24 |
|  | 31 | 36 | 33 | 49 | 48 | 56 | 44.4 | 23 |
| **April** | 1 | 50 | 67 | 53 | 43 | 40 | 50.6 | 27 |
|  | 2 | 44 | 52 | 46 | 47 | 44 | 46.6 | 8 |
|  | 3 | 70 | 45 | 50 | 47 | 41 | 50.6 | 29 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| TABLE 2 Data for week of April 6—10 | | | | | | |
| **Date** |  | **1** | **2** | **3** | **4** | **5** |
| **April** | 6 | 45 | 45 | 39 | 45 | 38 |
|  | 7 | 46 | 48 | 48 | 46 | 46 |
|  | 8 | 52 | 49 | 50 | 54 | 52 |
|  | 9 | 57 | 53 | 57 | 52 | 53 |
|  | 10 | 63 | 66 | 61 | 61 | 70 |

**The control limits for the *x*-chart** are:

UCLx= *x* + *A*2*R* and LCLx = *x* - *A*2*R*

Where

*X* = central line of the chart, which can be either the average of past sample means or a target value set for the process.

*A*2 = constant to provide three-sigma limits for the sample mean.

**The control limits for the *R*-chart** are UCLR = *D*4*R* and LCLR = *D*3*R*where

*R* = average of several past *R* values and the central line of the chart.  
  
*D*3,*D*4 = constants that provide 3 standard deviations (three-sigma) limits for a given sample size.

