**Дисперсионный анализ**

Провести однофакторный анализ.

Провести двухфакторный анализ – по желанию.

**Однофакторный дисперсионный анализ**

На предприятии реализованы инновационные процессы, имеющие своей целью улучшить качество продукции и по возможности исключить влияние случайных факторов, снижающих качество. Требуется оценить влияние случайных факторов на качество продукции по результатам выборочного контроля с доверительной вероятностью α= 0,95.

Имеется *s* партий изделий, из каждой партии отобрано по *t* образцов и оценено их качество. Результаты оценки приведены в таблице (см. ниже по вариантам).

Вариант №1 Вариант №2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *t*  *s* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |  | *t*  *s* | 1 | 2 | 3 | 4 |
| 1 | 40 | 25 | 45 | 30 | 35 | 40 | 60 |  | 1 | 30 | 40 | 60 | 45 |
| 2 | 80 | 35 | 70 | 40 | 45 | 30 | 50 |  | 2 | 35 | 35 | 40 | 50 |
| 3 | 55 | 70 | 60 | 70 | 65 | 45 | 80 |  | 3 | 80 | 70 | 85 | 60 |
| 4 | 60 | 110 | 90 | 70 | 80 | 75 | 70 |  | 4 | 90 | 85 | 100 | 105 |
|  |  |  |  |  |  |  |  |  | 5 | 75 | 70 | 72 | 68 |
|  |  |  |  |  |  |  |  |  | 6 | 43 | 50 | 55 | 46 |
|  |  |  |  |  |  |  |  |  | 7 | 77 | 78 | 70 | 65 |

Вариант №3 Вариант №4

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *t*  *s* | 1 | 2 | 3 | 4 | 5 | 6 |  | *t*  *s* | 1 | 2 | 3 | 4 | 5 |
| 1 | 54 | 60 | 68 | 75 | 73 | 58 |  | 1 | 165 | 130 | 142 | 150 | 137 |
| 2 | 84 | 82 | 93 | 95 | 102 | 87 |  | 2 | 121 | 105 | 114 | 130 | 118 |
| 3 | 70 | 77 | 84 | 80 | 87 | 91 |  | 3 | 108 | 97 | 104 | 125 | 110 |
| 4 | 48 | 40 | 55 | 51 | 60 | 47 |  | 4 | 180 | 194 | 175 | 185 | 200 |
| 5 | 94 | 85 | 100 | 95 | 82 | 103 |  | 5 | 154 | 140 | 156 | 163 | 148 |
|  |  |  |  |  |  |  |  | 6 | 140 | 126 | 137 | 120 | 132 |

Вариант №5 Вариант №6

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *t*  *s* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |  | *t*  *s* | 1 | 2 | 3 | 4 |
| 1 | 85 | 90 | 80 | 95 | 100 | 110 | 105 |  | 1 | 120 | 105 | 100 | 115 |
| 2 | 70 | 100 | 75 | 80 | 95 | 105 | 85 |  | 2 | 95 | 98 | 110 | 103 |
| 3 | 60 | 70 | 80 | 75 | 90 | 85 | 80 |  | 3 | 72 | 80 | 81 | 75 |
| 4 | 50 | 55 | 50 | 40 | 44 | 55 | 40 |  | 4 | 83 | 88 | 92 | 85 |
|  |  |  |  |  |  |  |  |  | 5 | 100 | 110 | 105 | 110 |
|  |  |  |  |  |  |  |  |  | 6 | 90 | 85 | 92 | 86 |
|  |  |  |  |  |  |  |  |  | 7 | 75 | 80 | 85 | 70 |

Вариант №7 Вариант №8

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *t*  *s* | 1 | 2 | 3 | 4 | 5 | 6 |  | *t*  *s* | 1 | 2 | 3 | 4 | 5 |
| 1 | 40 | 60 | 44 | 56 | 41 | 50 |  | 1 | 28 | 20 | 18 | 25 | 23 |
| 2 | 63 | 70 | 58 | 65 | 71 | 75 |  | 2 | 31 | 25 | 42 | 38 | 29 |
| 3 | 50 | 43 | 55 | 60 | 64 | 70 |  | 3 | 40 | 36 | 50 | 47 | 51 |
| 4 | 80 | 73 | 90 | 85 | 92 | 86 |  | 4 | 30 | 40 | 38 | 45 | 43 |
| 5 | 46 | 54 | 60 | 40 | 56 | 44 |  | 5 | 15 | 26 | 19 | 20 | 28 |
|  |  |  |  |  |  |  |  | 6 | 50 | 80 | 84 | 62 | 73 |

Вариант №9 Вариант №10

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *t*  *s* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |  | *t*  *s* | 1 | 2 | 3 | 4 |
| 1 | 120 | 100 | 115 | 125 | 105 | 130 | 120 |  | 1 | 92 | 85 | 80 | 98 |
| 2 | 100 | 80 | 75 | 85 | 90 | 100 | 85 |  | 2 | 40 | 47 | 55 | 50 |
| 3 | 140 | 135 | 150 | 135 | 145 | 160 | 150 |  | 3 | 60 | 65 | 60 | 70 |
| 4 | 160 | 150 | 145 | 170 | 180 | 175 | 165 |  | 4 | 80 | 90 | 88 | 94 |
|  |  |  |  |  |  |  |  |  | 5 | 75 | 78 | 80 | 75 |
|  |  |  |  |  |  |  |  |  | 6 | 65 | 75 | 72 | 70 |
|  |  |  |  |  |  |  |  |  | 7 | 55 | 58 | 50 | 60 |

Вариант №11 Вариант №12

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *t*  *s* | 1 | 2 | 3 | 4 | 5 | 6 |  | *t*  *s* | 1 | 2 | 3 | 4 | 5 |
| 1 | 153 | 168 | 175 | 170 | 150 | 160 |  | 1 | 90 | 98 | 120 | 105 | 114 |
| 2 | 180 | 173 | 155 | 164 | 160 | 178 |  | 2 | 82 | 92 | 100 | 80 | 87 |
| 3 | 120 | 125 | 132 | 140 | 135 | 130 |  | 3 | 65 | 72 | 80 | 75 | 90 |
| 4 | 160 | 140 | 155 | 144 | 162 | 148 |  | 4 | 120 | 124 | 141 | 130 | 135 |
| 5 | 146 | 170 | 150 | 164 | 171 | 138 |  | 5 | 110 | 102 | 96 | 93 | 100 |
|  |  |  |  |  |  |  |  | 6 | 80 | 75 | 77 | 83 | 89 |

Вариант №13 Вариант №14

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *t*  *s* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |  | *t*  *s* | 1 | 2 | 3 | 4 |
| 1 | 50 | 48 | 72 | 52 | 55 | 40 | 55 |  | 1 | 50 | 60 | 45 | 35 |
| 2 | 60 | 80 | 75 | 90 | 65 | 85 | 90 |  | 2 | 55 | 80 | 100 | 60 |
| 3 | 140 | 115 | 100 | 120 | 135 | 140 | 125 |  | 3 | 70 | 45 | 80 | 60 |
| 4 | 95 | 125 | 115 | 100 | 130 | 125 | 120 |  | 4 | 105 | 80 | 105 | 65 |
|  |  |  |  |  |  |  |  |  | 5 | 90 | 75 | 50 | 100 |
|  |  |  |  |  |  |  |  |  | 6 | 70 | 50 | 105 | 80 |
|  |  |  |  |  |  |  |  |  | 7 | 80 | 105 | 45 | 90 |

Вариант №15 Вариант №16

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *t*  *s* | 1 | 2 | 3 | 4 | 5 | 6 |  | *t*  *s* | 1 | 2 | 3 | 4 | 5 |
| 1 | 125 | 80 | 95 | 120 | 104 | 110 |  | 1 | 18 | 17 | 24 | 35 | 19 |
| 2 | 100 | 90 | 85 | 88 | 102 | 95 |  | 2 | 63 | 57 | 50 | 68 | 59 |
| 3 | 70 | 68 | 75 | 84 | 80 | 89 |  | 3 | 40 | 82 | 54 | 65 | 78 |
| 4 | 110 | 100 | 94 | 105 | 112 | 90 |  | 4 | 54 | 48 | 40 | 43 | 51 |
| 5 | 90 | 115 | 105 | 97 | 110 | 96 |  | 5 | 75 | 84 | 87 | 90 | 78 |
|  |  |  |  |  |  |  |  | 6 | 120 | 131 | 115 | 140 | 127 |

**Двухфакторный дисперсионный анализ**

Провести двухфакторный дисперсионный анализ данных, представленных таблицей (см. ниже по вариантам) при доверительной вероятности α= 0,95.

Вариант №17

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *В* | *А* | | | | | | | | | | | | | | |
| *А*1 | | | | | *А*2 | | | | | *А*3 | | | | |
| *В*1 | 151 | 113 | 128 | 125 | 117 | 109 | 150 | 42 | 86 | 61 | 78 | 140 | 142 | 150 | 155 |
| *В*2 | 140 | 99 | 122 | 130 | 115 | 127 | 92 | 76 | 98 | 105 | 164 | 185 | 170 | 160 | 180 |
| *В*3 | 80 | 98 | 100 | 76 | 88 | 86 | 121 | 65 | 134 | 99 | 45 | 135 | 145 | 170 | 155 |
| *В*4 | 67 | 84 | 72 | 90 | 80 | 75 | 114 | 150 | 57 | 75 | 83 | 120 | 135 | 140 | 125 |
| *В*5 | 75 | 112 | 144 | 42 | 60 | 47 | 120 | 70 | 80 | 100 | 55 | 108 | 112 | 115 | 120 |

Вариант №18

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *В* | *А* | | | | | | | | | | | | | | |
| *А*1 | | | | | *А*2 | | | | | *А*3 | | | | |
| *В*1 | 20 | 22 | 28 | 30 | 35 | 25 | 24 | 65 | 43 | 54 | 70 | 85 | 55 | 83 | 52 |
| *В*2 | 44 | 50 | 52 | 46 | 40 | 55 | 48 | 20 | 22 | 29 | 18 | 25 | 30 | 72 | 140 |
| *В*3 | 50 | 60 | 45 | 65 | 57 | 61 | 47 | 17 | 26 | 31 | 21 | 23 | 27 | 65 | 63 |
| *В*4 | 26 | 20 | 27 | 30 | 32 | 28 | 25 | 25 | 28 | 32 | 35 | 35 | 30 | 60 | 78 |
| *В*5 | 50 | 74 | 36 | 46 | 47 | 38 | 29 | 42 | 47 | 50 | 53 | 45 | 58 | 85 | 70 |

Вариант №19

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *В* | *А* | | | | | | | | | | | | | | |
| *А*1 | | | | | *А*2 | | | | | *А*3 | | | | |
| *В*1 | 123 | 140 | 137 | 146 | 102 | 105 | 140 | 118 | 110 | 70 | 120 | 100 | 70 | 80 | 75 |
| *В*2 | 150 | 164 | 170 | 174 | 100 | 80 | 46 | 50 | 85 | 45 | 75 | 80 | 70 | 75 | 70 |
| *В*3 | 25 | 45 | 30 | 35 | 40 | 60 | 38 | 74 | 105 | 30 | 55 | 85 | 30 | 40 | 60 |
| *В*4 | 35 | 70 | 40 | 45 | 30 | 50 | 121 | 92 | 50 | 60 | 110 | 60 | 35 | 35 | 40 |
| *В*5 | 70 | 60 | 70 | 65 | 45 | 80 | 110 | 90 | 80 | 85 | 45 | 80 | 80 | 70 | 85 |

Вариант №20

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *В* | *А* | | | | | | | | | | | | | | |
| *А*1 | | | | | *А*2 | | | | | *А*3 | | | | |
| *В*1 | 200 | 180 | 240 | 260 | 245 | 230 | 210 | 170 | 150 | 155 | 165 | 160 | 170 | 175 | 120 |
| *В*2 | 195 | 205 | 215 | 200 | 225 | 210 | 220 | 205 | 215 | 200 | 240 | 220 | 225 | 220 | 75 |
| *В*3 | 205 | 200 | 225 | 240 | 235 | 210 | 240 | 100 | 120 | 130 | 105 | 115 | 105 | 120 | 55 |
| *В*4 | 185 | 170 | 200 | 210 | 195 | 205 | 220 | 140 | 150 | 145 | 160 | 140 | 140 | 155 | 110 |
| *В*5 | 110 | 70 | 120 | 100 | 105 | 30 | 55 | 85 | 50 | 60 | 110 | 60 | 85 | 90 | 45 |

Вариант №21

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *В* | *А* | | | | | | | | | | | | | | |
| *А*1 | | | | | *А*2 | | | | | *А*3 | | | | |
| *В*1 | 20 | 40 | 35 | 22 | 25 | 60 | 63 | 55 | 65 | 46 | 54 | 60 | 68 | 75 | 58 |
| *В*2 | 45 | 40 | 38 | 35 | 50 | 53 | 58 | 50 | 57 | 63 | 84 | 82 | 93 | 95 | 87 |
| *В*3 | 18 | 25 | 20 | 28 | 120 | 48 | 33 | 70 | 54 | 28 | 70 | 77 | 84 | 80 | 91 |
| *В*4 | 35 | 30 | 25 | 32 | 40 | 57 | 40 | 75 | 30 | 100 | 48 | 40 | 55 | 51 | 47 |
| *В*5 | 42 | 38 | 40 | 50 | 28 | 55 | 45 | 50 | 70 | 60 | 94 | 85 | 100 | 95 | 60 |