# Ռեսուրսների բաշխման խնդիր (Առաջադրանք 5.2)

Կառավարման կենտրոնը իր տրամադրության տակ ունի S=36 ռեսուրս։ Անհրաժեշտ է ռեսուրսներն բաշխել n=9 արտադրությունների միջև, որպեսզի գումարային եկամուտը լինի առավելագույնը, ընդ որում յուրաքանչյուր արտադրության եկամուտի ֆունկցիան որոշվում է հետևյալ կերպ․

***,***

X - արտադրությանը տրամադրված ռեսուրսի քանակն է,

, – հաստատուն գործակիցներ են։

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
|  | 3 | 4 | 5.5 | 3 | 4.5 | 2.5 | 4 | 5 | 4.5 |

**Եկամտի քանակը արտադրությունների համար համապատասխան քանակությամբ ռեսուսների համար`**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **i=1** | **i=2** | **i=3** | **i=4** | **i=5** | **i=6** | **i=7** | **i=8** | **i=9** |
| c=0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| c=1 | 4.7510 | 3.9267 | 9.9591 | 7.6017 | 2.9666 | 6.4254 | 1.9633 | 7.9460 | 2.9666 |
| c=2 | 4.9752 | 3.9973 | 9.9996 | 7.9603 | 2.9992 | 6.90598 | 1.9986 | 7.9992 | 2.999 |
| c=3 | 4.99814 | 3.99992 | 9.9999 | 7.9970 | 2.9999 | 6.98839 | 1.9999 | 7.9999 | 2.999 |
| c=4 | 4.99987 | 3.9999 | 10 | 7.9998 | 3 | 6.9987 | 1.9999 | 8 | 3 |
| c=5 | 4.9999 | 4 | 10 | 7.9999 | 3 | 6.9998 | 2 | 8 | 3 |
| c=6 | 5 | 4 | 10 | 7.9999 | 3 | 6.9999 | 2 | 8 | 3 |
| c=7 | 5 | 4 | 10 | 8 | 3 | 6.9999 | 2 | 8 | 3 |
| c=8 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=9 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=10 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=11 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=12 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=13 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=14 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=15 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=16 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=17 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=18 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=19 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=20 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=21 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=22 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=23 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=24 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=25 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=26 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=27 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=28 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=29 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=30 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=31 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=32 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=33 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=34 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=35 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |
| c=36 | 5 | 4 | 10 | 8 | 3 | 7 | 2 | 8 | 3 |

Կազմենք անդրադարձ բանաձևը․

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Օգտագործելով անդրադարձ բանաձևը որոշենք ներդրումների պայմանական օպտիմալ բաշխումները։

|  |  |  |
| --- | --- | --- |
| **Z=1** |  |  |
| 0 | 0 | 0 |
| 1 | 4.75106 | 1 |
| 2 | 4.97524 | 2 |
| 3 | 4.99815 | 3 |
| 4 | 4.99988 | 4 |
| 5 | 4.99999 | 5 |
| 6 | 5 | 6 |
| 7 | 5 | 7 |
| 8 | 5 | 8 |
| 9 | 5 | 9 |
| 10 | 5 | 10 |
| 11 | 5 | 11 |
| 12 | 5 | 12 |
| 13 | 5 | 13 |
| 14 | 5 | 13 |
| 15 | 5 | 13 |
| 16 | 5 | 13 |
| 17 | 5 | 13 |
| 18 | 5 | 13 |
| 19 | 5 | 13 |
| 20 | 5 | 13 |
| 21 | 5 | 13 |
| 22 | 5 | 13 |
| 23 | 5 | 13 |
| 24 | 5 | 13 |
| 25 | 5 | 13 |
| 26 | 5 | 13 |
| 27 | 5 | 13 |
| 28 | 5 | 13 |
| 29 | 5 | 13 |
| 30 | 5 | 13 |
| 31 | 5 | 13 |
| 32 | 5 | 13 |
| 33 | 5 | 13 |
| 34 | 5 | 13 |
| 35 | 5 | 13 |
| 36 | 5 | 13 |

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| --- | --- | --- |
| **Z=2** |  |  |
| 0 | 0 | 0 |
| 1 | 3.92674 | 1 |
| 2 | 8.6778 | 1 |
| 3 | 8.90198 | 1 |
| 4 | 8.97256 | 2 |
| 5 | 8.99547 | 2 |
| 6 | 8.99808 | 3 |
| 7 | 8.9998 | 3 |
| 8 | 8.99992 | 3 |
| 9 | 8.99999 | 4 |
| 10 | 9 | 4 |
| 11 | 9 | 5 |
| 12 | 9 | 5 |
| 13 | 9 | 6 |
| 14 | 9 | 6 |
| 15 | 9 | 6 |
| 16 | 9 | 7 |
| 17 | 9 | 7 |
| 18 | 9 | 8 |
| 19 | 9 | 8 |
| 20 | 9 | 9 |
| 21 | 9 | 9 |
| 22 | 9 | 9 |
| 23 | 9 | 10 |
| 24 | 9 | 10 |
| 25 | 9 | 10 |
| 26 | 9 | 10 |
| 27 | 9 | 10 |
| 28 | 9 | 10 |
| 29 | 9 | 10 |
| 30 | 9 | 10 |
| 31 | 9 | 10 |
| 32 | 9 | 10 |
| 33 | 9 | 10 |
| 34 | 9 | 10 |
| 35 | 9 | 10 |
| 36 | 9 | 10 |

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| --- | --- | --- |
| **Z=3** |  |  |
| 0 | 0 | 0 |
| 1 | 9.95913 | 1 |
| 2 | 13.8859 | 1 |
| 3 | 18.6369 | 1 |
| 4 | 18.8611 | 1 |
| 5 | 18.9317 | 1 |
| 6 | 18.9722 | 2 |
| 7 | 18.9951 | 2 |
| 8 | 18.9977 | 2 |
| 9 | 18.9995 | 2 |
| 10 | 18.9998 | 3 |
| 11 | 18.9999 | 3 |
| 12 | 19 | 3 |
| 13 | 19 | 3 |
| 14 | 19 | 4 |
| 15 | 19 | 4 |
| 16 | 19 | 4 |
| 17 | 19 | 4 |
| 18 | 19 | 4 |
| 19 | 19 | 5 |
| 20 | 19 | 5 |
| 21 | 19 | 5 |
| 22 | 19 | 5 |
| 23 | 19 | 6 |
| 24 | 19 | 6 |
| 25 | 19 | 6 |
| 26 | 19 | 6 |
| 27 | 19 | 7 |
| 28 | 19 | 7 |
| 29 | 19 | 7 |
| 30 | 19 | 7 |
| 31 | 19 | 7 |
| 32 | 19 | 7 |
| 33 | 19 | 7 |
| 34 | 19 | 7 |
| 35 | 19 | 7 |
| 36 | 19 | 7 |

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| --- | --- | --- |
| **Z=4** |  |  |
| 0 | 0 | 0 |
| 1 | 7.6017 | 1 |
| 2 | 17.5608 | 1 |
| 3 | 21.4876 | 1 |
| 4 | 26.2386 | 1 |
| 5 | 26.5973 | 2 |
| 6 | 26.8215 | 2 |
| 7 | 26.8921 | 2 |
| 8 | 26.9326 | 2 |
| 9 | 26.9693 | 3 |
| 10 | 26.9922 | 3 |
| 11 | 26.9949 | 4 |
| 12 | 26.9975 | 4 |
| 13 | 26.9993 | 4 |
| 14 | 26.9996 | 4 |
| 15 | 26.9998 | 5 |
| 16 | 26.9999 | 5 |
| 17 | 27 | 5 |
| 18 | 27 | 6 |
| 19 | 27 | 6 |
| 20 | 27 | 6 |
| 21 | 27 | 6 |
| 22 | 27 | 7 |
| 23 | 27 | 7 |
| 24 | 27 | 7 |
| 25 | 27 | 8 |
| 26 | 27 | 8 |
| 27 | 27 | 8 |
| 28 | 27 | 9 |
| 29 | 27 | 9 |
| 30 | 27 | 9 |
| 31 | 27 | 10 |
| 32 | 27 | 10 |
| 33 | 27 | 10 |
| 34 | 27 | 10 |
| 35 | 27 | 11 |
| 36 | 27 | 11 |

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| --- | --- | --- |
| **Z=5** |  |  |
| 0 | 0 | 0 |
| 1 | 2.96667 | 1 |
| 2 | 10.5684 | 1 |
| 3 | 20.5275 | 1 |
| 4 | 24.4542 | 1 |
| 5 | 29.2053 | 1 |
| 6 | 29.564 | 1 |
| 7 | 29.7882 | 1 |
| 8 | 29.8588 | 1 |
| 9 | 29.8993 | 1 |
| 10 | 29.9359 | 1 |
| 11 | 29.9685 | 2 |
| 12 | 29.9914 | 2 |
| 13 | 29.9942 | 2 |
| 14 | 29.9968 | 2 |
| 15 | 29.9985 | 2 |
| 16 | 29.9993 | 3 |
| 17 | 29.9996 | 3 |
| 18 | 29.9998 | 3 |
| 19 | 29.9999 | 3 |
| 20 | 30 | 3 |
| 21 | 30 | 4 |
| 22 | 30 | 4 |
| 23 | 30 | 4 |
| 24 | 30 | 4 |
| 25 | 30 | 4 |
| 26 | 30 | 4 |
| 27 | 30 | 4 |
| 28 | 30 | 5 |
| 29 | 30 | 5 |
| 30 | 30 | 5 |
| 31 | 30 | 5 |
| 32 | 30 | 5 |
| 33 | 30 | 6 |
| 34 | 30 | 6 |
| 35 | 30 | 6 |
| 36 | 30 | 6 |

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| --- | --- | --- |
| **Z=6** |  |  |
| 0 | 0 | 0 |
| 1 | 6.42541 | 1 |
| 2 | 9.39208 | 1 |
| 3 | 16.9938 | 1 |
| 4 | 26.9529 | 1 |
| 5 | 30.8797 | 1 |
| 6 | 35.6307 | 1 |
| 7 | 36.1113 | 2 |
| 8 | 36.47 | 2 |
| 9 | 36.6942 | 2 |
| 10 | 36.7766 | 3 |
| 11 | 36.8471 | 3 |
| 12 | 36.8877 | 3 |
| 13 | 36.9243 | 3 |
| 14 | 36.9569 | 3 |
| 15 | 36.9798 | 3 |
| 16 | 36.9902 | 4 |
| 17 | 36.9929 | 4 |
| 18 | 36.9955 | 4 |
| 19 | 36.9973 | 4 |
| 20 | 36.9984 | 5 |
| 21 | 36.9991 | 5 |
| 22 | 36.9995 | 5 |
| 23 | 36.9996 | 5 |
| 24 | 36.9998 | 6 |
| 25 | 36.9999 | 6 |
| 26 | 37 | 6 |
| 27 | 37 | 6 |
| 28 | 37 | 7 |
| 29 | 37 | 7 |
| 30 | 37 | 7 |
| 31 | 37 | 7 |
| 32 | 37 | 7 |
| 33 | 37 | 8 |
| 34 | 37 | 8 |
| 35 | 37 | 8 |
| 36 | 37 | 8 |

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| --- | --- | --- |
| **Z=7** |  |  |
| 0 | 0 | 0 |
| 1 | 1.96337 | 1 |
| 2 | 8.38877 | 1 |
| 3 | 11.3554 | 1 |
| 4 | 18.9572 | 1 |
| 5 | 28.9163 | 1 |
| 6 | 32.843 | 1 |
| 7 | 37.5941 | 1 |
| 8 | 38.0747 | 1 |
| 9 | 38.4334 | 1 |
| 10 | 38.6575 | 1 |
| 11 | 38.7399 | 1 |
| 12 | 38.8105 | 1 |
| 13 | 38.851 | 1 |
| 14 | 38.8877 | 1 |
| 15 | 38.923 | 2 |
| 16 | 38.9556 | 2 |
| 17 | 38.9785 | 2 |
| 18 | 38.9888 | 2 |
| 19 | 38.9916 | 2 |
| 20 | 38.9942 | 2 |
| 21 | 38.9959 | 2 |
| 22 | 38.9972 | 3 |
| 23 | 38.9984 | 3 |
| 24 | 38.9991 | 3 |
| 25 | 38.9994 | 3 |
| 26 | 38.9996 | 3 |
| 27 | 38.9997 | 3 |
| 28 | 38.9998 | 3 |
| 29 | 38.9999 | 3 |
| 30 | 39 | 4 |
| 31 | 39 | 4 |
| 32 | 39 | 4 |
| 33 | 39 | 4 |
| 34 | 39 | 4 |
| 35 | 39 | 4 |
| 36 | 39 | 4 |

|  |  |  |
| --- | --- | --- |
| **Z=8** |  |  |
| 0 | 0 | 0 |
| 1 | 7.9461 | 1 |
| 2 | 9.90947 | 1 |
| 3 | 16.3349 | 1 |
| 4 | 19.3015 | 1 |
| 5 | 26.9032 | 1 |
| 6 | 36.8624 | 1 |
| 7 | 40.7891 | 1 |
| 8 | 45.5402 | 1 |
| 9 | 46.0208 | 1 |
| 10 | 46.3794 | 1 |
| 11 | 46.6036 | 1 |
| 12 | 46.686 | 1 |
| 13 | 46.7566 | 1 |
| 14 | 46.8098 | 2 |
| 15 | 46.8503 | 2 |
| 16 | 46.887 | 2 |
| 17 | 46.9223 | 2 |
| 18 | 46.9548 | 2 |
| 19 | 46.9778 | 2 |
| 20 | 46.9881 | 2 |
| 21 | 46.9909 | 2 |
| 22 | 46.9935 | 2 |
| 23 | 46.9952 | 2 |
| 24 | 46.9965 | 2 |
| 25 | 46.9976 | 2 |
| 26 | 46.9984 | 2 |
| 27 | 46.9991 | 3 |
| 28 | 46.9994 | 3 |
| 29 | 46.9996 | 3 |
| 30 | 46.9997 | 3 |
| 31 | 46.9998 | 3 |
| 32 | 46.9999 | 3 |
| 33 | 46.9999 | 3 |
| 34 | 47 | 3 |
| 35 | 47 | 3 |
| 36 | 47 | 3 |

|  |  |  |
| --- | --- | --- |
| **Z=9** |  |  |
| 0 | 0 | 0 |
| 1 | 2.96667 | 1 |
| 2 | 10.9128 | 1 |
| 3 | 12.8761 | 1 |
| 4 | 19.3015 | 1 |
| 5 | 22.2682 | 1 |
| 6 | 29.8699 | 1 |
| 7 | 39.8291 | 1 |
| 8 | 43.7558 | 1 |
| 9 | 48.5069 | 1 |
| 10 | 48.9874 | 1 |
| 11 | 49.3461 | 1 |
| 12 | 49.5703 | 1 |
| 13 | 49.6527 | 1 |
| 14 | 49.7233 | 1 |
| 15 | 49.7765 | 1 |
| 16 | 49.817 | 1 |
| 17 | 49.8536 | 1 |
| 18 | 49.8889 | 1 |
| 19 | 49.9215 | 1 |
| 20 | 49.9541 | 2 |
| 21 | 49.977 | 2 |
| 22 | 49.9874 | 2 |
| 23 | 49.9901 | 2 |
| 24 | 49.9927 | 2 |
| 25 | 49.9945 | 2 |
| 26 | 49.9958 | 2 |
| 27 | 49.9969 | 2 |
| 28 | 49.9976 | 2 |
| 29 | 49.9984 | 3 |
| 30 | 49.9991 | 3 |
| 31 | 49.9994 | 3 |
| 32 | 49.9996 | 3 |
| 33 | 49.9997 | 3 |
| 34 | 49.9998 | 3 |
| 35 | 49.9999 | 3 |
| 36 | 49.9999 | 3 |

Առավել մանրամասն հաշվարկները կարող եք տեսնել հետևյալ հղմամբ` <https://github.com/hakobyyan/hvgh/blob/master/kursayin/Distributor_calculations.pdf>

Օպտիմալ բաշխումները՝  
Արտադրություն 1: 5 ռեսուրս -> Եկամուտ: 5  
Արտադրություն 2: 4 ռեսուրս -> Եկամուտ: 4  
Արտադրություն 3: 3 ռեսուրս -> Եկամուտ: 10  
Արտադրություն 4: 5 ռեսուրս -> Եկամուտ: 8  
Արտադրություն 5: 3 ռեսուրս -> Եկամուտ: 3  
Արտադրություն 6: 6 ռեսուրս -> Եկամուտ: 7  
Արտադրություն 7: 4 ռեսուրս -> Եկամուտ: 2  
Արտադրություն 8: 3 ռեսուրս -> Եկամուտ: 8  
Արտադրություն 9: 3 ռեսուրս -> Եկամուտ: 3  
Առավելագույն եկամուտը՝ 50