# 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 | 0.25 | 0.07 | 0.04 | 0.4 | 0.03 | 0.57 | 0.04 | 0.05 | 0.03 |
| c=2 | 1.98 | 1.01 | 1.24 | 3.17 | 0.6 | 3.44 | 0.5 | 1.26 | 0.6 |
| c=3 | 3.74 | 2.4 | 4.07 | 5.98 | 1.59 | 5.73 | 1.2 | 3.73 | 1.59 |
| c=4 | 4.61 | 3.36 | 6.88 | 7.38 | 2.38 | 6.67 | 1.68 | 5.93 | 2.38 |
| c=5 | 4.91 | 3.8 | 8.68 | 7.85 | 2.78 | 6.93 | 1.9 | 7.19 | 2.78 |
| c=6 | 4.98 | 3.95 | 9.53 | 7.97 | 2.94 | 6.99 | 1.97 | 7.74 | 2.94 |
| c=7 | 5 | 3.99 | 9.86 | 7.99 | 2.98 | 7 | 1.99 | 7.93 | 2.98 |
| c=8 | 5 | 4 | 9.96 | 8 | 3 | 7 | 2 | 7.98 | 3 |
| c=9 | 5 | 4 | 9.99 | 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 | 0.248935 | 1 |
| 2 | 1.98237 | 2 |
| 3 | 3.7371 | 3 |
| 4 | 4.61248 | 4 |
| 5 | 4.90651 | 5 |
| 6 | 4.98145 | 6 |
| 7 | 4.99687 | 7 |
| 8 | 4.99954 | 8 |
| 9 | 4.99994 | 9 |
| 10 | 4.99999 | 10 |
| 11 | 5 | 11 |
| 12 | 5 | 12 |
| 13 | 5 | 13 |
| 14 | 5 | 14 |
| 15 | 5 | 15 |
| 16 | 5 | 16 |
| 17 | 5 | 17 |
| 18 | 5 | 18 |
| 19 | 5 | 19 |
| 20 | 5 | 20 |
| 21 | 5 | 20 |
| 22 | 5 | 20 |
| 23 | 5 | 20 |
| 24 | 5 | 20 |
| 25 | 5 | 20 |
| 26 | 5 | 20 |
| 27 | 5 | 20 |
| 28 | 5 | 20 |
| 29 | 5 | 20 |
| 30 | 5 | 20 |
| 31 | 5 | 20 |
| 32 | 5 | 20 |
| 33 | 5 | 20 |
| 34 | 5 | 20 |
| 35 | 5 | 20 |
| 36 | 5 | 20 |

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| **Z=2** |  |  |
| 0 | 0 | 0 |
| 1 | 0.073262556 | 1 |
| 2 | 1.00941971 | 2 |
| 3 | 2.402626798 | 3 |
| 4 | 3.810360266 | 1 |
| 5 | 4.746517421 | 2 |
| 6 | 6.139724509 | 3 |
| 7 | 7.09845251 | 4 |
| 8 | 7.973830199 | 4 |
| 9 | 8.40993057 | 5 |
| 10 | 8.703966398 | 5 |
| 11 | 8.853422668 | 6 |
| 12 | 8.928357533 | 6 |
| 13 | 8.969603301 | 7 |
| 14 | 8.985031697 | 7 |
| 15 | 8.994576504 | 8 |
| 16 | 8.997244809 | 8 |
| 17 | 8.999148386 | 9 |
| 18 | 8.999546502 | 9 |
| 19 | 8.999880238 | 10 |
| 20 | 8.999932489 | 10 |
| 21 | 8.999984706 | 11 |
| 22 | 8.999992084 | 12 |
| 23 | 8.999998207 | 12 |
| 24 | 8.999999157 | 13 |
| 25 | 8.999999805 | 13 |
| 26 | 8.999999918 | 14 |
| 27 | 8.99999998 | 14 |
| 28 | 8.999999993 | 15 |
| 29 | 8.999999998 | 15 |
| 30 | 8.999999999 | 16 |
| 31 | 9 | 16 |
| 32 | 9 | 17 |
| 33 | 9 | 17 |
| 34 | 9 | 18 |
| 35 | 9 | 18 |
| 36 | 9 | 19 |

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| **Z=3** |  |  |
| 0 | 0 | 0 |
| 1 | 0.040867714 | 1 |
| 2 | 1.23768951 | 2 |
| 3 | 4.070414101 | 3 |
| 4 | 6.883584229 | 4 |
| 5 | 8.678555808 | 5 |
| 6 | 9.532738108 | 6 |
| 7 | 9.858634583 | 7 |
| 8 | 11.08118261 | 5 |
| 9 | 12.48891607 | 5 |
| 10 | 13.42507323 | 5 |
| 11 | 14.81828032 | 5 |
| 12 | 15.77700832 | 5 |
| 13 | 16.65238601 | 5 |
| 14 | 17.50656831 | 6 |
| 15 | 17.94266868 | 6 |
| 16 | 18.26856515 | 7 |
| 17 | 18.56260098 | 7 |
| 18 | 18.71205725 | 7 |
| 19 | 18.81609522 | 8 |
| 20 | 18.89103009 | 8 |
| 21 | 18.93227585 | 8 |
| 22 | 18.96086544 | 9 |
| 23 | 18.97629384 | 9 |
| 24 | 18.98583865 | 9 |
| 25 | 18.99274031 | 10 |
| 26 | 18.99540861 | 10 |
| 27 | 18.99731219 | 10 |
| 28 | 18.99879842 | 11 |
| 29 | 18.99919654 | 11 |
| 30 | 18.99953028 | 11 |
| 31 | 18.99981923 | 12 |
| 32 | 18.99987148 | 12 |
| 33 | 18.9999237 | 12 |
| 34 | 18.99997491 | 13 |
| 35 | 18.99998325 | 14 |
| 36 | 18.99999062 | 14 |

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| **Z=4** |  |  |
| 0 | 0 | 0 |
| 1 | 0.398296547 | 1 |
| 2 | 3.171786015 | 2 |
| 3 | 5.979356337 | 3 |
| 4 | 7.37996064 | 4 |
| 5 | 7.850417964 | 5 |
| 6 | 10.05537024 | 2 |
| 7 | 12.86294057 | 3 |
| 8 | 14.65791215 | 3 |
| 9 | 16.05851645 | 4 |
| 10 | 16.91269875 | 4 |
| 11 | 17.38315607 | 5 |
| 12 | 18.46827241 | 3 |
| 13 | 19.86887671 | 4 |
| 14 | 20.80503387 | 4 |
| 15 | 22.19824096 | 4 |
| 16 | 23.15696896 | 4 |
| 17 | 24.03234665 | 4 |
| 18 | 24.88652895 | 4 |
| 19 | 25.35698627 | 5 |
| 20 | 25.79308664 | 5 |
| 21 | 26.11898312 | 5 |
| 22 | 26.41301894 | 5 |
| 23 | 26.56247521 | 5 |
| 24 | 26.682371 | 6 |
| 25 | 26.78640897 | 6 |
| 26 | 26.86134383 | 6 |
| 27 | 26.9025896 | 6 |
| 28 | 26.93117919 | 6 |
| 29 | 26.95586463 | 7 |
| 30 | 26.97129302 | 7 |
| 31 | 26.98083783 | 7 |
| 32 | 26.98773949 | 7 |
| 33 | 26.99200878 | 8 |
| 34 | 26.99467708 | 8 |
| 35 | 26.99658066 | 8 |
| 36 | 26.99806689 | 8 |

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| **Z=5** |  |  |
| 0 | 0 | 0 |
| 1 | 0.03332699 | 1 |
| 2 | 0.599068358 | 2 |
| 3 | 3.205113005 | 1 |
| 4 | 6.012683327 | 1 |
| 5 | 7.413287629 | 1 |
| 6 | 7.979028997 | 2 |
| 7 | 10.08869723 | 1 |
| 8 | 12.89626756 | 1 |
| 9 | 14.69123914 | 1 |
| 10 | 16.09184344 | 1 |
| 11 | 16.94602574 | 1 |
| 12 | 17.65193126 | 3 |
| 13 | 18.50611356 | 3 |
| 14 | 19.9022037 | 1 |
| 15 | 20.83836086 | 1 |
| 16 | 22.23156795 | 1 |
| 17 | 23.19029595 | 1 |
| 18 | 24.06567364 | 1 |
| 19 | 24.91985594 | 1 |
| 20 | 25.62576146 | 3 |
| 21 | 26.47994376 | 3 |
| 22 | 27.26246294 | 4 |
| 23 | 27.73292027 | 4 |
| 24 | 28.16902064 | 4 |
| 25 | 28.57230143 | 5 |
| 26 | 28.8981979 | 5 |
| 27 | 29.19223373 | 5 |
| 28 | 29.34828752 | 6 |
| 29 | 29.49774379 | 6 |
| 30 | 29.61763957 | 6 |
| 31 | 29.72167754 | 6 |
| 32 | 29.79661241 | 6 |
| 33 | 29.84516568 | 7 |
| 34 | 29.88641145 | 7 |
| 35 | 29.91500104 | 7 |
| 36 | 29.93968647 | 7 |

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| **Z=6** |  |  |
| 0 | 0 | 0 |
| 1 | 0.57459499 | 1 |
| 2 | 3.436472166 | 2 |
| 3 | 5.734769709 | 3 |
| 4 | 6.673462612 | 4 |
| 5 | 6.933983495 | 5 |
| 6 | 9.449155493 | 2 |
| 7 | 11.74745304 | 3 |
| 8 | 13.14805734 | 3 |
| 9 | 14.08675024 | 4 |
| 10 | 16.33273972 | 2 |
| 11 | 18.63103727 | 3 |
| 12 | 20.42600884 | 3 |
| 13 | 21.82661315 | 3 |
| 14 | 22.76530605 | 4 |
| 15 | 23.61948835 | 4 |
| 16 | 24.32539387 | 4 |
| 17 | 25.63697341 | 3 |
| 18 | 26.57566632 | 4 |
| 19 | 27.96633766 | 3 |
| 20 | 28.92506566 | 3 |
| 21 | 29.86375856 | 4 |
| 22 | 30.73913625 | 4 |
| 23 | 31.59331855 | 4 |
| 24 | 32.29922407 | 4 |
| 25 | 33.15340637 | 4 |
| 26 | 33.93592555 | 4 |
| 27 | 34.40638288 | 4 |
| 28 | 34.84248325 | 4 |
| 29 | 35.24576404 | 4 |
| 30 | 35.57166051 | 4 |
| 31 | 35.86569634 | 4 |
| 32 | 36.12621722 | 5 |
| 33 | 36.28227102 | 5 |
| 34 | 36.43172729 | 5 |
| 35 | 36.55162307 | 5 |
| 36 | 36.65566104 | 5 |

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| **Z=7** |  |  |
| 0 | 0 | 0 |
| 1 | 0.036631278 | 1 |
| 2 | 0.611226268 | 1 |
| 3 | 3.473103443 | 1 |
| 4 | 5.771400987 | 1 |
| 5 | 6.710093889 | 1 |
| 6 | 7.178172467 | 2 |
| 7 | 9.48578677 | 1 |
| 8 | 11.78408431 | 1 |
| 9 | 13.18468862 | 1 |
| 10 | 14.12338152 | 1 |
| 11 | 16.369371 | 1 |
| 12 | 18.66766854 | 1 |
| 13 | 20.46264012 | 1 |
| 14 | 21.86324442 | 1 |
| 15 | 22.80193733 | 1 |
| 16 | 23.65611963 | 1 |
| 17 | 24.36202515 | 1 |
| 18 | 25.67360469 | 1 |
| 19 | 26.61229759 | 1 |
| 20 | 28.00296893 | 1 |
| 21 | 28.96169693 | 1 |
| 22 | 29.90038984 | 1 |
| 23 | 30.77576753 | 1 |
| 24 | 31.62994983 | 1 |
| 25 | 32.33585535 | 1 |
| 26 | 33.19003765 | 1 |
| 27 | 33.97255683 | 1 |
| 28 | 34.44301416 | 1 |
| 29 | 35.13723895 | 3 |
| 30 | 35.61660295 | 4 |
| 31 | 36.08706028 | 4 |
| 32 | 36.52316065 | 4 |
| 33 | 36.92644144 | 4 |
| 34 | 37.25233791 | 4 |
| 35 | 37.54637374 | 4 |
| 36 | 37.80689462 | 4 |

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| **Z=8** |  |  |
| 0 | 0 | 0 |
| 1 | 0.053903576 | 1 |
| 2 | 1.259456402 | 2 |
| 3 | 3.730742204 | 3 |
| 4 | 5.926737857 | 4 |
| 5 | 7.192598478 | 5 |
| 6 | 7.738643643 | 6 |
| 7 | 9.502143191 | 3 |
| 8 | 11.69813884 | 4 |
| 9 | 12.96399947 | 5 |
| 10 | 13.90269237 | 5 |
| 11 | 15.51482652 | 3 |
| 12 | 17.71082217 | 4 |
| 13 | 19.11142647 | 4 |
| 14 | 20.5165437 | 1 |
| 15 | 22.39841075 | 3 |
| 16 | 24.5944064 | 4 |
| 17 | 26.38937798 | 4 |
| 18 | 27.78998228 | 4 |
| 19 | 29.0558429 | 5 |
| 20 | 29.9945358 | 5 |
| 21 | 30.8487181 | 5 |
| 22 | 31.60034255 | 4 |
| 23 | 32.86620317 | 5 |
| 24 | 33.92970679 | 4 |
| 25 | 35.19556741 | 5 |
| 26 | 36.15429541 | 5 |
| 27 | 37.09298831 | 5 |
| 28 | 37.968366 | 5 |
| 29 | 38.8225483 | 5 |
| 30 | 39.52845383 | 5 |
| 31 | 40.38263613 | 5 |
| 32 | 41.16515531 | 5 |
| 33 | 41.71120048 | 6 |
| 34 | 42.32983743 | 5 |
| 35 | 42.8758826 | 6 |
| 36 | 43.3552466 | 6 |

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| **Z=9** |  |  |
| 0 | 0 | 0 |
| 1 | 0.03332699 | 1 |
| 2 | 0.599068358 | 2 |
| 3 | 1.593414816 | 3 |
| 4 | 3.764069193 | 1 |
| 5 | 5.960064847 | 1 |
| 6 | 7.225925467 | 1 |
| 7 | 7.791666836 | 2 |
| 8 | 9.535470181 | 1 |
| 9 | 11.73146583 | 1 |
| 10 | 12.99732645 | 1 |
| 11 | 13.93601936 | 1 |
| 12 | 15.54815351 | 1 |
| 13 | 17.74414916 | 1 |
| 14 | 19.14475346 | 1 |
| 15 | 20.54987069 | 1 |
| 16 | 22.43173774 | 1 |
| 17 | 24.62773339 | 1 |
| 18 | 26.42270497 | 1 |
| 19 | 27.82330927 | 1 |
| 20 | 29.08916989 | 1 |
| 21 | 30.02786279 | 1 |
| 22 | 30.88204509 | 1 |
| 23 | 31.63366954 | 1 |
| 24 | 32.89953016 | 1 |
| 25 | 33.96303378 | 1 |
| 26 | 35.2288944 | 1 |
| 27 | 36.1876224 | 1 |
| 28 | 37.1263153 | 1 |
| 29 | 38.00169299 | 1 |
| 30 | 38.85587529 | 1 |
| 31 | 39.56178082 | 1 |
| 32 | 40.41596312 | 1 |
| 33 | 41.1984823 | 1 |
| 34 | 41.97605095 | 3 |
| 35 | 42.75857013 | 4 |
| 36 | 43.54108931 | 4 |

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