Selection of Skip Lot Sampling Plan V With Single Sampling Plan As Reference Plan Involving Minimum Sum Of Risks

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Abstract: Acceptance sampling plans are the practical tools for quality assurance applications involving product quality control. Acceptance sampling systems are advocated when small sample size are necessary or desirable towards costlier testing for product quality. When the lots in a series are accepted without any inspection, then sampling inspection is carried for immediately preceding lots, when meets the acceptance criteria towards decision making. Whenever a sampling inspection is considered, the lot is either accepted or rejected along with associated producer and consumer's risk. This paper presents a new procedure for the selection of Skip Lot Sampling Plan V with Single Sampling Plan as reference plan involving minimum sum of risks.

Index Terms - **Skip Lot Sampling Plan, Single Sampling Plan, Minimum sum of risks, Accepting quality level, Limiting quality level.**

1. INTRODUCTION

Acceptance sampling plan is a procedure for application of statistical techniques to determine whether a quality of material should be accepted or rejected. Most logistic and retailing companies suffer from returned items considered as defective by customers. Generally, the most fundamental reason for defects comes from the manufacturing site is due to imperfect production. Therefore, knowing how to prevent the selling of defective products to the customer is an important problem. In the serial or complex non-serial manufacturing systems, one suggests several ways to use acceptance sampling methods to prevent defects. In particular, acceptance sampling is a key indicator for the total quality control system and useful, when the inspection process is expensive, destructive or takes a longer time.

Dodge [3] has introduced the concept of skip-lot sampling, by applying the principles of a continuous sampling plan of type CSP-1 to a series of lots or batches of material. This plan is designated as the SkSP-1 plan and specifically applicable for bulk materials or products produced in successive lots. Generally, skip lot sampling plans are designed to reduce inspection costs.

Perry[9] has developed a system of sampling inspection plan known as SkSP-2. This Plan involves inspection of only a fraction '*f* ' of the submitted lots when quality of the submitted product is good as demonstrated by the quality of the product. These plans are applicable to products produced or furnished in successive lots or batches. A SkSP-2 plan is one that uses a given lot inspection plan by the method of attributes (single, double sampling, multiple sampling etc.,) called the 'reference plan' together with a procedure that calls for normally inspecting every lot, but for inspecting only a fraction of the lots when the quality is good. The plan includes specific rules based on the record of lot acceptance and rejections, for switching back and forth between "normal inspection" (inspecting every lot) and 'skipping inspection' (inspecting only a fraction of the lots).

Parker and Kessler[7] have modified the existing SkSP-2 plan under which atleast one unit is always sampled from lot. The expression for the probability of acceptance using this plan are derived and compared with standard skip lot plans.

Balamurali and Jun[1] have developed a new system of skip lot sampling plan designated as SkSP-V based on the principles of CSP-V plan. This plan requires the return to the normal inspection whenever a lot is rejected, but it has a provision for a reduced, normal inspection upon demonstration of superior product quality.

Peach and Littauer [8] developed an iterative algorithm for finding the parameters of a Single Sampling Plan satisfying the conditions such as $P_a(p_1) \geq 1\text{-}\alpha$ and $P_a(p_2) \leq \beta$ under the conditions of Poisson distribution based on the percentiles of the OC function using χ^2 approximation. Similar such algorithms were developed by Guenther [6] for designing single and double sampling plans such that the parameters of the plans satisfy the conditions $P_a(p_1) \geq 1\text{-}\alpha$ and $P_a(p_2) \leq \beta$. Cameron [2] adopted unity value approach under the conditions of Poisson model, and the operating ratio for determining the parameters of single sampling plans by attributes and for computing the points for the plot of associated OC curves.

Golub[4] has developed a method of designing a single Sampling plan when the sample size is fixed and has given an expression for c such that the sum of two risks namely producer's risk (α) and consumer's risk (β) is minimum. Minimizing α+β is same as maximizing (1-α) + (1-β). The Golub's approach for single sampling plan has been extended by Soundararajan[11] under Poisson model.

Soundararajan [10] constructed the tables for the selection of ChSP-1 plans under Poisson model and also given a formula for i which minimizes the sum of producer's and consumer's risk for specified AQL and LQL when the sample size is fixed.

Soundararajan and Govindaraju[12] have also studied the ChSP-1 plan involving minimum sum of producers and consumers risks.

Soundararajan and Govindaraju[13] have given the tables for the selection of Single Sampling Plan which minimizes sum of producer's and consumer's risk without specifying sample size under Poisson model. Soundararajan and Vijayaraghavan[14] have applied Golub's approach for designing Multiple Deferred Sampling Plan MDS-(0, 2) when sample size is fixed for given values of AQL and LQL such that α and β are small.

Subramani[15] has studied the selection of single sampling plans for given p_1, p_2, α and β involving minimum sum of risks. He has also studied attribute Double Sampling Plan, ChSP (0, 1), Multiple Deferred Sampling Plan of type MDS (c_1, c_2) and MDS-1 (c_1, c_2), RGS plan, and Link Sampling Plan involving minimum sum of producer's and consumer's risk.

Govindaraju [5] proposed a procedure for finding a single sampling plan based on a point on the OC curve which corresponds to the lot of either good or bad quality and has established that such plans will be preferable when minimum average total inspection is of interest.

2. SKIP LOT SAMPLING PLAN V

MIL-STD 1235C contains five different types of continuous sampling plans, namely CSP-1, CSP-2, CSP-F, CSP-V and CSP-T. In situations where there is no advantage of reducing the sampling frequency upon demonstration of good product quality, inspection can be streamlined by using a smaller clearance interval. This is the main feature of the CSP-V. The CSP-V plan is a single-level continuous sampling plan which provides for alternating sequences of 100% inspection and sampling inspection and requiring a shorter sequence of 100% inspection if it has been a long time since the previous 100% inspection phase. Based on the principles of CSP-V plan, a new system of skip-lot sampling plan designated as SkSP-V skip-lot sampling procedure is developed for the quality inspection of continuous flow of bulk products.

The SkSP-V plan, like other skip-lot plans, has both continuous sampling part for choosing which lots to inspect, and lot sampling part called 'reference plan' for inspecting the chosen lots. In addition to the parameters of CSP-V plan, a more general parameter is also incorporated in the proposed skip-lot sampling plan. The proposed sampling plan has a provision for reducing the normal inspection. It should be mentioned that when a lot is rejected, it will be 100% inspected first and all the non-conforming units will be replaced with conforming one or reworked to be conforming.

3. THE OPERATING PROCEDURE FOR SKSP-V PLAN

(1) At the outset, start with normal inspection using the reference plan. During the normal inspection, lots are inspected one by one in the order of production or in the order of being submitted to inspection.
(2) When i consecutive lots are accepted on normal inspection, discontinue the normal inspection and switch to skipping inspection.
(3) During skipping inspection, inspect only a fraction 'f' of the lots selected at random. Skipping inspection is continued until sampled lot is rejected.
(4) When a lot is rejected on skipping inspection before k consecutively sampled lots are accepted, revert to normal inspection as per (1) above.
(5) When a lot is rejected after k consecutive lots have been accepted revert to normal inspection with reduced clearance number x as per (6) given below.
(6) During normal inspection with clearance number x, lots are inspected one by one in the order of being submitted to inspection. This continues until either a lot is rejected or x lots are accepted, whichever occurs earlier.
(7) When a lot is rejected, immediately revert to normal inspection with clearance number i as per (1) given above.
(8) When x lots are accepted, discontinue normal inspection and switch to skipping inspection as per (3) above.
(9) When a lot is rejected, perform 100% inspection (screening) and replace all the non-conforming units found with conforming units in the rejected lots in the case of non-destructive testing.

4. OPERATING PROCEDURE FOR SINGLE SAMPLING PLAN

Select a random sample of size *'n'* and count the number of non-conforming units *'d'*. If there is *'c'* or less non-conforming units, the lot is accepted, otherwise the lot is rejected. Thus the plan is characterized by two parameters viz, the sample size *'n'* and the acceptance number *'c'*. The OC function of the single sampling plan is given as

$$Pa(p) = P(d < c, n) \quad (1)$$

5. ADVANTAGE OF DESIGNING SAMPLING PLANS THROUGH MINIMUM SUM OF RISKS

(1) The plans tabulated have realistic operating ratios which are commonly encountered in practice.
(2) The OC curves of such plans will have a better 'shoulder' effect.
(3) When the producer's and consumer's belong to the same company or interest, the sum of risks may be minimized rather than fixing them at given levels.

6. SELECTION OF MINIMUM SUM OF RISKS FOR SINGLE SAMPLING PLAN

Table 1 is used to select a SkSP-V with Single Sampling Plan as reference for given AQL *(p_1)* and LQL *(p_2)* which involves minimum sum of risks. For the plan of Table 1 producer and consumer risk will be at most 10% each against fixed values of the operating ratio p_2/p_1. Table 2 gives the parameters *c, i, k* and *f*, producer risk and consumer risk (α & β respectively) in the body of the table against the product of sample size *(n)* and AQL (p_1). With the given p_1, p_2, α and β, one can find SkSP-V with SSP as follows. Compute the operating ratio p_2/p_1.

(1) With the computed value of p_2/p_1, enter Table 1 with row headed by p_2/p_1 which is equal to or just smaller than the computed ratios.

(2) The parameters *c, i, k* and *f* of the SkSP-V with SSP are obtained from the Table 1, one proceeds from left to right with the row identified in step 2, such that the tabulated producer risk and consumer risks are equal to or just smaller than the desired values.

Example 6.1

If one fixes $p_1 = 0.01$, $p_2 = 0.15$ with $\alpha = 0.05$ and $\beta = 0.10$, then one obtains SkSP-V with SSP using Table 1 as follows:

1) $p_2/p_1 = 0.15/0.01 = 15$
2) Tabulated $p_2/p_1 = 15$
3) Corresponding to $c = 3$, $i = 1$, $k = 2$, $f = 1/3$ given in the body of the table, one obtains $\alpha = 0.3$, $\beta = 0.4$ against the desired value of $\alpha = 0.05$, $\beta = 0.10$.
4) $n = 0.25/0.01 = 25$

7. Construction of Tables

The expression for the OC function of SkSP-V with SSP as reference plan is given as

$$P_a(p) = \frac{fP + (1-f)P^i + fP^{k+1}(P^i - P^k)}{f(1+P^{i+k} - P^{2k}) + (1-f)P^i} \qquad (2)$$

Where $P = \sum_{x=0}^{c} \frac{e^{-np}(np)^x}{x!}$ (3)

is the OC function for SSP as reference plan.

The expression for the sum of the producer and consumer risks is given as

$$(\alpha + \beta) = [1 - P_a(p_1)] + P_a(p_2) \qquad (4)$$

If the operating ratio p_2/p_1 and np_1 are known, then the expression for np_2 can be written as

$$np_2 = \left(\frac{p_2}{p_1}\right)(np_1) \qquad (5)$$

The parameter *c, i, k* and *f* corresponding to the minimum $[1 - P_a(p_1)] + P_a(p_2)$ are obtained through searching for $k = 2(0.3)\ 15$, $c = 3\ (0.4)\ 0.25$ with the help of solving expression through computer program.

The values in Table 1 gives producers and consumer risks which are obtained corresponding to the values of *c, i, k* and *f* for which the sum of risk is minimum.

Table 1

Parameters for SkSP-V with SSP as reference plan for *i*=1, *k*=2 for given OR and np_1

OR \ np_1	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60
50	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
49	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
48	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
47	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
46	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
45	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
44	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
43	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
42	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
41	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
40	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
39	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
38	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.0	4,1/4 0.0,0.0	5,1/5 0.0,0.0	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
37	1,2/3 0.0,0.0	2,1/2 0.0,0.0	3,1/3 0.0,0.1	4,1/4 0.0,0.1	5,1/5 0.0,0.1	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
36	1,2/3 0.0,0.0	2,1/2 0.0,0.1	3,1/3 0.0,0.1	4,1/4 0.0,0.1	5,1/5 0.0,0.1	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
35	1,2/3 0.0,0.1	2,1/2 0.0,0.1	3,1/3 0.0,0.1	4,1/4 0.0,0.1	5,1/5 0.0,0.1	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
34	1,2/3 0.0,0.1	2,1/2 0.0,0.1	3,1/3 0.0,0.1	4,1/4 0.0,0.1	5,1/5 0.0,0.1	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.0	10,1/5 0.0,0.0
33	1,2/3 0.0,0.1	2,1/2 0.0,0.1	3,1/3 0.0,0.1	4,1/4 0.0,0.1	5,1/5 0.0,0.1	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.0	9,1/4 0.0,0.1	10,1/5 0.0,0.1
32	1,2/3 0.0,0.1	2,1/2 0.0,0.1	3,1/3 0.0,0.1	4,1/4 0.0,0.1	5,1/5 0.0,0.1	6,2/3 0.0,0.0	7,1/2 0.0,0.0	8,1/3 0.0,0.1	9,1/4 0.0,0.1	10,1/5 0.0,0.1
31	1,2/3 0.0,0.1	2,1/2 0.0,0.1	3,1/3 0.0,0.1	4,1/4 0.1,0.1	5,1/5 0.1,0.1	6,2/3 0.0,0.1	7,1/2 0.0,0.1	8,1/3 0.0,0.1	9,1/4 0.0,0.1	10,1/5 0.0,0.1
30	1,2/3 0.0,0.1	2,1/2 0.0,0.1	3,1/3 0.1,0.1	4,1/4 0.1,0.1	5,1/5 0.1,0.1	6,2/3 0.0,0.1	7,1/2 0.0,0.1	8,1/3 0.0,0.1	9,1/4 0.0,0.1	10,1/5 0.0,0.1

Table 1 cont.

np₁ / ***OR***	**0.15**	**0.20**	**0.25**	**0.30**	**0.35**	**0.40**	**0.45**	**0.50**	**0.55**	**0.60**
29	1,2/3 0.0,0.1	3,1/3 0.0,0.1	3,1/3 0.1,0.1	4,1/4 0.0,0.2	5,1/5 0.0,0.2	6,2/3 0.0,0.1	7,1/2 0.0,0.1	8,1/3 0.0,0.1	9,1/4 0.0,0.2	10,1/5 0.1,0.1
28	1,2/3 0.0,0.1	2,1/2 0.1,0.1	3,1/3 0.1,0.1	4,1/4 0.1,0.2	5,1/5 0.1,0.2	6,2/3 0.0,0.1	7,1/2 0.0,0.1	8,1/3 0.1,0.1	9,1/4 0.0,0.2	10,1/5 0.0,0.2
27	1,2/3 0.0,0.1	2,1/2 0.1,0.1	3,1/3 0.0,0.2	4,1/4 0.1,0.2	5,1/5 0.1,0.2	6,2/3 0.0,0.1	7,1/2 0.1,0.1	8,1/3 0.0,0.2	9,1/4 0.0,0.2	10,1/5 0.1,0.2
26	1,2/3 0.0,0.1	2,1/2 0.0,0.2	3,1/3 0.1,0.2	4,1/4 0.0,0.3	5,1/5 0.1,0.3	6,2/3 0.1,0.1	7,1/2 0.1,0.1	8,1/3 0.0,0.2	9,1/4 0.1,0.2	10,1/5 0.0,0.3
25	1,2/3 0.1,0.1	2,1/2 0.0,0.2	3,1/3 0.1,0.2	4,1/4 0.1,0.3	5,1/5 0.1,0.3	6,2/3 0.1,0.1	7,1/2 0.0,0.2	8,1/3 0.0,0.3	9,1/4 0.1,0.3	10,1/5 0.1,0.3
24	1,2/3 0.1,0.1	2,1/2 0.0,0.2	3,1/3 0.0,0.3	4,1/4 0.2,0.2	5,1/5 0.1,0.4	6,2/3 0.0,0.2	7,1/2 0.1,0.2	8,1/3 0.1,0.3	9,1/4 0.0,0.4	10,1/5 0.2,0.3
23	1,2/3 0.0,0.2	2,1/2 0.1,0.2	3,1/3 0.2,0.2	4,1/4 0.2,0.3	5,1/5 0.2,0.3	6,2/3 0.1,0.2	7,1/2 0.0,0.3	8,1/3 0.2,0.2	9,1/4 0.2,0.3	10,1/5 0.1,0.4
22	1,2/3 0.0,0.2	2,1/2 0.1,0.2	3,1/3 0.0,0.4	4,1/4 0.1,0.4	5,1/5 0.1,0.5	6,2/3 0.0,0.3	7,1/2 0.1,0.3	8,1/3 0.2,0.3	9,1/4 0.1,0.4	10,1/5 0.1,0.5
21	1,2/3 0.1,0.2	2,1/2 0.0,0.3	3,1/3 0.2,0.3	4,1/4 0.1,0.5	5,1/5 0.2,0.4	6,2/3 0.2,0.2	7,1/2 0.0,0.4	8,1/3 0.1,0.4	9,1/4 0.1,0.5	10,1/5 0.3,0.4
20	1,2/3 0.1,0.2	2,1/2 0.1,0.3	3,1/3 0.1,0.4	4,1/4 0.2,0.4	5,1/5 0.1,0.6	6,2/3 0.1,0.3	7,1/2 0.1,0.4	8,1/3 0.3,0.3	9,1/4 0.2,0.5	10,1/5 0.2,0.5
19	1,2/3 0.0,0.3	2,1/2 0.2,0.2	3,1/3 0.2,0.4	4,1/4 0.3,0.4	5,1/5 0.3,0.4	6,2/3 0.1,0.4	7,1/2 0.0,0.5	8,1/3 0.2,0.5	9,1/4 0.1,0.6	10,1/5 0.4,0.4
18	1,2/3 0.0,0.3	2,1/2 0.2,0.3	3,1/3 0.2,0.4	4,1/4 0.2,0.5	5,1/5 0.2,0.6	6,2/3 0.2,0.3	7,1/2 0.2,0.4	8,1/3 0.3,0.4	9,1/4 0.2,0.6	10,1/5 0.2,0.6
17	1,2/3 0.1,0.3	2,1/2 0.1,0.4	3,1/3 0.1,0.5	4,1/4 0.1,0.6	5,1/5 0.3,0.5	6,2/3 0.3,0.3	7,1/2 0.2,0.5	8,1/3 0.2,0.6	9,1/4 0.3,0.5	10,1/5 0.3,0.6
16	1,2/3 0.2,0.2	2,1/2 0.0,0.5	3,1/3 0.2,0.5	4,1/4 0.2,0.6	5,1/5 0.4,0.4	6,2/3 0.2,0.4	7,1/2 0.3,0.4	8,1/3 0.3,0.5	9,1/4 0.3,0.6	10,1/5 0.2,0.7
15	1,2/3 0.0,0.4	2,1/2 0.2,0.4	3,1/3 0.3,0.4	4,1/4 0.1,0.7	5,1/5 0.3,0.6	6,2/3 0.3,0.4	7,1/2 0.4,0.4	8,1/3 0.4,0.4	9,1/4 0.2,0.7	10,1/5 0.4,0.5
14	1,2/3 0.2,0.3	2,1/2 0.3,0.3	3,1/3 0.2,0.6	4,1/4 0.3,0.5	5,1/5 0.4,0.5	6,2/3 0.2,0.5	7,1/2 0.2,0.6	8,1/3 0.2,0.7	9,1/4 0.4,0.5	10,1/5 0.1,0.8
13	1,2/3 0.1,0.4	2,1/2 0.2,0.5	3,1/3 0.4,0.4	4,1/4 0.4,0.5	5,1/5 0.1,0.8	6,2/3 0.4,0.4	7,1/2 0.4,0.5	8,1/3 0.3,0.6	9,1/4 0.1,0.8	10,1/5 02,0.8
12	1,2/3 0.1,0.5	2,1/2 0.3,0.4	3,1/3 0.3,0.5	4,1/4 0.3,0.6	5,1/5 0.1,0.8	6,2/3 0.2,0.6	7,1/2 0.3,0.6	8,1/3 0.4,0.5	9,1/4 0.5,0.5	10,1/5 0.3,0.7
11	1,2/3 0.2,0.4	2,1/2 0.3,0.5	3,1/3 0.3,0.6	4,1/4 0.1,0.8	5,1/5 0.5,0.5	6,2/3 0.3,0.6	7,1/2 0.1,0.8	8,1/3 0.4,0.6	9,1/4 0.4,0.6	10,1/5 0.4,0.6
10	1,2/3 0.3,0.4	2,1/2 0.2,0.6	3,1/3 0.4,0.5	4,1/4 0.0,0.9	5,1/5 0.4,0.6	6,2/3 0.4,0.5	7,1/2 0.3,0.7	8,1/3 0.3,0.7	9,1/4 0.3,0.7	10,1/5 0.5,0.5

c	***f***
α	***β***

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