

# TABLE OF CONTENTS

<b>ABSTRACT</b> .....	1
<b>1 INTRODUCTION</b> .....	1
<b>2 APPLICATIONS</b> .....	2
2.1 Applications of $P(n; N, p)$ .....	2
a. Developability of silver specks.....	2
b. Clustering of Leukemia cases.....	3
c. Dialing calls.....	3
2.2 Applications of $P'(n; \lambda, p)$ .....	4
d. Visual perception.....	4
e. Pedestrians on a street.....	5
f. A counter problem.....	5
g. A queueing problem.....	5
h. Breaking strength of materials.....	6
2.3 Applications as approximations to quotas.....	6
i. A learning criterion.....	8
j. Target detection systems.....	8
k. Quality control.....	9
l. Acceptance sampling.....	9
m. Faults in a sequence of trials.....	9
n. Other applications.....	9
<b>3 COMPUTING THE CLUSTER PROBABILITY <math>P(n; N, p)</math></b> .....	10
3.1 Existing formulas and approaches.....	10
3.2 An alternative way to compute $P(n; N, p)$ .....	14
Description of approach.....	14
Enumerating the partitions of $N$ .....	16
Efficient calculation of determinants.....	17
Refinement: zero suppression.....	19
Refinement: Wolf's observation.....	20
Refinement: Precision improvement.....	21
<b>REFERENCES</b> .....	22
<b>APPENDIX</b> .....	25
<b>TABLE 1</b> Clustering Probability $P(n; N, p)$ .....	29
<b>TABLE 1a</b> Clustering Probability $P(n; N, p)$ .....	43
<b>TABLE 2</b> Poisson Cluster Probability $P'(n; \lambda, p)$ .....	142
<b>TABLE 2a</b> Poisson Cluster Probability $P'(n; \lambda, 1/L)$ .....	162
<b>TABLE 3</b> Piecewise Polynomials for $P(n; N, p)$ .....	176
<b>TABLE 4</b> Mean and Variance of Shortest Interval.....	205