Mathematics Statistics III

Correlation

Québec

1. INTRODUCTION

This Definition of the Domain for Summative Evaluation describes and classifies the essential and representative elements of the secondary-level adult education Mathematics program and, more specifically, of the course entitled Statistics III (Correlation). As such, it gives an overview of the program, but should by no means replace the program itself. The purpose of defining the domain is to ensure that all summative evaluation instruments are consistent with the overall program.

The Definition of the Domain for Summative Evaluation for each course in this program is organized in a similar manner; however, the content of this definition of the domain is specific to the course entitled Statistics III (Correlation).

The goal of the Definition of the Domain for Summative Evaluation is to prepare examinations that are valid from one version to another or from one school board to another, taking into account the responsibilities shared by the Ministère de l'Éducation and the school boards.

2. PROGRAM ORIENTATIONS AND CONSEQUENCES FOR SUMMATIVE EVALUATION

ORIENTATIONS	CONSEQUENCES
The main objective of the secondary-level adult education Mathematics program is to help students fully understand mathematical concepts.	Evaluation should involve verifying whether the student has fully understood the different concepts.
The program is designed to help students master the use of certain mathematical tools used in the field of science and technology or in different trades.	Evaluation items should pertain to situations in the field of science and technology or to situations related to trades.
The program aims to provide students with the skills they need to process information by applying mathematical models and appropriate strategies for solving problems.	Evaluation items should involve performing tasks that require the students to classify information, use mathematical models and solve problems.
The program also aims to improve the students' ability to clearly relate information using mathematical language.	Evaluation items should involve performing tasks that require the use of mathematical language. The appropriateness and clarity of the language used should be taken into account in the marking process.
The program is intended to help students develop a systematic work method.	Evaluation items should require the students to present their work in a clear and structured manner. This should be taken into account in the marking process.
The program will help students master the use of technological tools.	The use of a scientific calculator or graphing calculator is permitted for the examinations related to this course.

3. CONTENT OF THE PROGRAM FOR PURPOSES OF SUMMATIVE EVALUATION

Concepts

One-variable distribution
– mean
– standard deviation
– relation between a data value, the standard score of a data value, the mean or the standard deviation of a distribution
– comparison of the means, standard scores, standard deviations or data values of two distributions
– problems that involve calculating and analyzing the mean and the standard deviation
– problems that involve calculating and analyzing the standard score

Two-variable distribution
– estimating the linear correlation coefficient by drawing a rectangle or an ellipse
– interpreting the linear correlation coefficient
– drawing an approximation of the regression line
– determining the approximate equation of the regression line
– solving problems that involve calculating and analyzing the correlation or the regression line

Skills

Each skill is defined within the context of a mathematics program.

Structuring

Being familiar with the fundamentals of mathematics, understanding some mathematical concepts and establishing simple cognitive relations among them.

Possible actions: to associate, classify, compare, complete, describe, define, contrast, distinguish, state, enumerate, group, name, rank, organize, recognize, arrange, and so on.

Operating

Performing a given operation or transformation.

Possible actions: to calculate, construct, break down, perform, estimate, evaluate, isolate, measure, reconstruct, solve, draw, transform, verify, and so on.

Analyzing

Demonstrating, in an organized fashion, the complex connections between concepts or definitions and their related actions and illustrations.

Possible actions: to conclude, correct, deduce, derive, demonstrate, explain, extrapolate, infer, justify, and so on.

Synthesizing

Effectively integrating a variety of concepts and skills to solve a problem.

Possible action: to solve a problem.

4.   TABLE OF DIMENSIONS

CONCEPTS SKILLS	ONE-VARIABLE DISTRIBUTION 35%	TWO-VARIABLE DISTRIBUTION 65%
STRUCTURING **10%**		Associate a linear correlation coefficient with two-variable distributions represented by a scatter plot. **5** **5%**
		Associate statements about the interpretation of the correlation in two-variable distributions with linear correlation coefficients. **6** **5%**
OPERATING **30%**	Determine a data value, the standard score of a data value, the mean or the standard deviation of a distribution, given the other three items of information. **1** **5%**	Given a scatter plot representing a distribution, estimate the linear correlation coefficient of this distribution by drawing a rectangle or an ellipse. **7** **10%**
		Determine the approximate equation of the regression line for a distribution represented by a scatter plot and find the missing coordinate of an ordered pair belonging to this regression line. **8** **5%**
		Given a distribution presented in a table, describe the linear correlation (i.e. its degree and direction). **9** **5%**
ANALYZING **10%**	Using examples, verify statements comparing means, standard scores, standard deviations or data values in two distributions. **2** **10%**	
SYNTHESIZING **50%**	Solve a problem that involves calculating and analyzing the mean and the standard deviation. **3** **10%**	Solve a problem that involves analyzing the correlation or the regression line. **10** **10%**
	Solve a problem that involves calculating and analyzing the standard score. **4** **10%**	Solve two problems that involve calculating and analyzing the correlation or the regression line. **11** **20%**

5. OBSERVABLE BEHAVIOURS

Examination items should be formulated on the basis of the observable behaviours listed below. The requirements and restrictions specified in the dimensions and the objectives of the program must be observed.

Dimension 1

Determine a data value, the standard score of a data value, the mean or the standard deviation of a distribution, given the other three items of information.
(operating)   /5

Dimension 2

Using examples, verify statements comparing characteristics of two distributions. The characteristics that may be compared are the standard scores of data values, means, standard deviations or data values. Not all the numerical values are given.
(analyzing)   /10

Dimension 3

Solve a problem that involves calculating and analyzing the mean and the standard deviation of two one-variable distributions. Each distribution consists of 15 to 20 data values. The students must clearly show all their work.
(synthesizing)   /10

Dimension 4

Solve a problem that involves calculating and analyzing the standard score of no more than 10 data values from several one-variable distributions. The means and standard deviations of these distributions are given. The students must clearly show all their work.
(synthesizing)   /10

Dimension 5

Associate a linear correlation coefficient with two-variable distributions represented by scatter plots.
(structuring)   /5

Dimension 6

Associate statements about the interpretation of the correlation in two-variable distributions with linear correlation coefficients.
(structuring)   /5

Dimension 7

Given a scatter plot representing a distribution, estimate the linear correlation coefficient of this distribution by drawing a rectangle or an ellipse. The distribution is presented in a contingency table. The students must clearly show all their work.
(operating)   /10

Dimension 8

Determine the approximate equation of the regression line for a two-variable distribution represented by a scatter plot and find the missing coordinate of an ordered pair belonging to this regression line. The means of the two variables are given. The students must clearly show all their work.
(operating)   /10

Dimension 9

Describe the linear correlation between the two variables in a distribution [i.e. indicate its degree (strong, moderate or weak) and its direction (zero, positive or negative)]. The distribution is presented in a table and consists of 10 to 15 ordered pairs. The students must justify their answers.
(operating)   /5

Dimension 10

Solve a problem that involves analyzing the correlation or the regression line for one or more two-variable distributions, each consisting of 10 to 15 ordered pairs. The linear correlation coefficient and the regression line are given for each distribution. The students must clearly show all their work.
(synthesizing)   /10

Dimension 11

Solve two problems that involve calculating and analyzing the correlation or the regression line for a two-variable distribution consisting of 10 to 15 ordered pairs. The students must clearly show all their work.
(synthesizing)   /20

Note: The formulas are not given.

6. JUSTIFICATION OF CHOICES

In the examination, 10% of the items test the students' **STRUCTURING** skills by verifying their ability to:
– estimate a linear correlation coefficient
– interpret a linear correlation coefficient

In the examination, 30% of the items test the students' **OPERATING** skills by verifying whether they have mastered certain operations or transformations:
– calculating the mean of a one-variable distribution
– calculating the standard deviation of a one-variable distribution
– calculating the standard score of data values in a one-variable distribution
– estimating the linear correlation coefficient by drawing a rectangle or an ellipse
– determining the approximate equation of the regression line for a two-variable distribution
– finding a missing coordinate of an ordered pair in a two-variable distribution
– describing the linear correlation for a two-variable distribution

In the examination, 10% of the items test the students' skill in **ANALYZING** information; they involve verifying whether the students have the ability to make connections:
– by comparing the characteristics of two distributions

In the examination, 50% of the items test the students' **SYNTHESIZING** skills by verifying their ability to:
– solve problems
– use a rigorous work method
– communicate clearly using mathematical language

7. DESCRIPTION OF THE EXAMINATION

A. TYPE OF EXAMINATION

The summative examination will be a written examination consisting of multiple-choice, short-response or extended-response items.

The items should take into account the restrictions and the requirements specified in the dimensions and the objectives of the program. The weighting of marks should be consistent with the percentages set out in the table of dimensions.

B. CHARACTERISTICS OF THE EXAMINATION

The examination will be administered in a single session lasting no more than two and a half hours.

Students are permitted to use a scientific calculator or a graphing calculator.

C. PASS MARK

The pass mark is set at 60 out of 100.