Getting SAS Certified

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Contents

1. Introduction

There are **5 major areas** of SAS Certification with eight specific certification exams.

SAS Foundation:

1. SAS Certified **Base Programmer** for SAS9
2. SAS Certified **Advanced Programmer** for SAS9.
3. SAS Certified Clinical Trials Programmer Using SAS9

SAS Advanced Analytics:

4. SAS Certified Predictive Modeler Using SAS Enterprise Miner 7.
5. SAS Certified Statistical Business Analyst Using SAS9 Regression & Modeling

SAS Business Intelligence:

6. SAS Certified BI Content Developer for SAS9.

SAS Data Management (Information Management):

7. SAS Certified Data Integration Developer for SAS9.

SAS Administration:

8. SAS Certified Platform Administrator for SAS9.

SAS Foundation

There are 3 specific **FOUNDATION** certification exams:

SAS Certified Base Programmer for SAS9:
Successful candidates for this exam should have the following programming and data management experience**:**

- Import and export raw data files**.**
- Manipulate and transform data**.**
- Combine SAS data sets**.**
- Create basic detail and summary reports using Base SAS procedures**.**
- Identify and correct data syntax and programming logic errors**.**

SAS Certified Advanced Programmer for SAS9:
Successful candidates for this exam should hold a SAS Certified Base Programmer for SAS9 credential and have current programming and data management experience using SAS9 to**:**

- Write efficient SAS code to solve complex problems, while minimizing the use of computer resources**.**
- Use advanced DATA step programming and efficiency techniques**.**
- Write and interpret SAS SQL code**.**
- Use the SAS Macro facility**.**

SAS Foundation

The third FOUNDATION certification exam is:

SAS Certified Clinical Trials Programmer Using SAS9:
Successful candidates for this exam should have experience in:

- Clinical trials process.
- Accessing, managing and transforming clinical trials data.
- Statistical procedures and macro programming.
- Reporting clinical trials results.
- Validating clinical trials data reporting.

SAS Advanced Analytics

There are 2 specific Advanced Analytics exams.

SAS Certified Statistical Business Analyst Using SAS9: Regression and Modeling.
Successful candidates for this exam should have experience in:

- Analysis of variance.
- Linear and logistic regression.
- Preparing inputs for predictive models.
- Measuring model performance.

SAS Certified Predictive Modeler Using SAS Enterprise Miner 7.
Successful candidates for this exam should have at least one year of experience with data mining and at least six months experience using SAS Enterprise Miner, including familiarity with the predictive modeling enhancements and functionalities available in SAS Enterprise Miner.

In addition, candidates should know how to do the following:

- Prepare data.
- Build predictive models.
- Assess models.
- Implement models.

SAS Business Intelligence

There is one exam in this area.

SAS Certified BI Content Developer for SAS9.
Successful candidates for this exam should have experience with the SAS platform and the ability to demonstrate the skills and knowledge necessary to develop or implement the following:

- Business user reporting applications.
- Advanced reporting techniques and roles.
- Information Maps.
- SAS BI Dashboard applications.
- Stored Processes.
- Advanced techniques with SAS Reports.
- Multidimensional (OLAP) data sources.
- Environment metadata.

Data Management / Information Management

There is one exam in this area.

SAS Certified Data Integration Developer for SAS9.
Successful candidates for this exam should have experience with the SAS platform and the ability to demonstrate the skills and knowledge necessary to:

- Define the **platform** for SAS Business Analytics architecture.
- Create metadata for the source data, target data and jobs.
- Work with transformations.
- Work with slowly changing dimensions.
- Define generated transformation.
- Deploy jobs.

SAS Administration

There is one exam in this area.

SAS Certified Platform Administrator for SAS9.
Successful candidates for this exam should have experience administering the SAS platform and the ability to demonstrate the skills and knowledge necessary to:

- Secure the SAS configuration on each server machine.
- Check status and operate servers.
- Monitor server activity and administer logging.
- Establish formal, regularly scheduled backup processes.
- Add users and manage their access.
- Establish connectivity to data sources.
- Set up and secure metadata folder structures.
- Administer repositories and move metadata.

2. Exam Content

SAS Foundation:

1. SAS Certified Base Programmer for SAS9.

A. Description:

- Exam is administered by SAS and Pearson VUE.
- **64** multiple-choice and short answer questions.
- Must achieve a score of 70% or higher to pass.
- **110** minutes to complete exam.
- Use exam ID A00-211; required when registering with Pearson VUE.

Exam Content

SAS Certified Base Programmer for SAS9.

B. Accessing Data:

- Use Formatted and LIST input to read raw data files.
- Use INFILE statement options to control processing when reading raw data files.
- Use various components of an INPUT statement to process raw data files including column and line pointer controls and trailing @ controls.
- Combine SAS data sets.
- Access data in an Excel spreadsheet.

C. Creating Data Structures:

- Create temporary and permanent SAS data sets.
- Create and manipulate SAS date values.
- Export data to create standard and comma-delimeted raw data files.
- Control which observations and variables in a SAS data are processed and output.

Exam Content

SAS Certified Base Programmer for SAS9.

D. Managing Data:

- Investigate SAS data libraries using base SAS utility procedures.
- Sort observations in a SAS data set.
- Conditionally execute SAS statements.
- Use assignment statements in the DATA step.
- Modify variable attributes using DATA step options and statements.
- Accumulate sub-totals and totals using DATA step statements.
- Use SAS functions to manipulate character data, numeric data and SAS date values.
- Use SAS functions to convert character data to numeric and vice versa.
- Process data using DO LOOPS.
- Process data using SAS arrays.
- Validate and clean data.

Exam Content

SAS Certified Base Programmer for SAS9

E. Generating Reports:

- Generating **list** reports using the PRINT procedure**.**
- Generate **summary** reports and Frequency tables using base SAS procedures**.**
- Enhance reports through the use of user-defined formats, titles, footnotes, and SAS system reporting options**.**
- Generate reports using **ODS** statements**.**

F. Handling Errors:

- Identify and resolve programming logic errors**.**
- Recognize and correct syntax errors**.**
- Examine and resolve data errors**.**

Exam Content

SAS Foundation:

2. SAS Certified **Advanced Programmer** for SAS9.

A. Description:

- Must have passed the Base Certification Exam as well as this exam (65% or higher) to be a certified Advanced SAS Programmer. This exam is also administered by SAS and Pearson VUE**.**
- **60-65** multiple-choice and short answer questions**; 2 hours** to complete**.**
- Use exam ID A00-212; required when registering with Pearson VUE**.**

B. Accessing Data Using SQL:

- Generate **detail** reports by working with a single table, joining tables, or using set operators in the **SQL** procedure**.**
- Generate **summary** reports by working with a single table, joining tables, or using set operators in the **SQL** procedure**.**
- Construct **sub-queries** and **in-line** views within an **SQL** procedure step**.**

Exam Content

SAS Certified Advanced Programmer for SAS9

B. Accessing Data using SQL (continued):

- Compare solving a problem using the SQL procedure versus using traditional SAS programming techniques, like the DATA step.
- Access **Dictionary Tables** using the **SQL** procedure.

C. Macro Processing:

- Create and use user-defined and automatic macro variables within the SAS Macro Language.
- Automate programs by defining and calling macros using the SAS Macro Language.
- Understand the use of macro functions.
- Use various options that are available for macro debugging and displaying values of user-defined and automatic macro variables in the SAS log.
- Create **data-driven** programs using SAS Macro Language.

Exam Content

SAS Certified Advanced Programmer for SAS9

C. Advanced Programming Techniques:

- Demonstrate the use of advanced data look-up techniques such as array processing, hash objects, formats, and combining/merging data.
- Reduce computing resource requirements by controlling the space required to store SAS data sets using compression techniques, LENGTH statements, or eliminating variables and observations.
- Reduce programming time by developing reusable SAS programs which incorporate DATA step views, DATA steps that write SAS programs and the FCMP procedure.
- Perform effective benchmarking by using the appropriate SAS System options and interpreting the resulting resource utilization statistics.
- Identify appropriate applications for using indexes and create them using the DATA step, the DATASETS procedure, or the SQL procedure.
- Compare techniques to eliminate duplicate data using the DATA step, the SORT procedure and the SQL procedure.

3. Exam Preparation

SAS Foundation:

SAS Certified **Base Programmer** for SAS9
SAS Certified **Advanced Programmer** for SAS9.
SAS Certified Clinical Trials Programmer Using SAS9

SAS Advanced Analytics:

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Exam Preparation – SAS Courses

SAS Foundation Preparation Courses:

SAS Certified **Base Programmer** for SAS9
- ❑ SAS Programming I – Essentials
- ❑ SAS Programming II – Data Manipulation Techniques

SAS Certified **Advanced Programmer** for SAS9.
- ❑ SAS Programming III
- ❑ SAS SQL
- ❑ SAS Macro Language 1

Exam Preparation – Sample Questions

SAS Certified Base Programmer for SAS9

Question B1: Which values are stored in the output data set?

```
data  WORK.TEST;
      input  Name $  Age ;
      datalines;
John   +32
;
run;
```

	Name	Age
A.	John	32
B.	John	(missing value)
C.	(missing value)	32
D.	The DATA step failed.	

Exam Preparation – Base Sample Questions

Question B2: What's the **first observation** in the data set WORK.BOTH?

Work.ONE

Id	Char_1
182	M
190	N
250	O
720	P

Work.TWO

Id	Char_2
182	Q
623	R
720	S

```
data  WORK.BOTH;
    merge WORK.ONE   WORK.TWO;
    by Id;
run;
```

	Id	Char_1	Char_2
A.	182	M	
B.	182		Q
C.	182	M	Q
D.	720	P	S

Exam Preparation – Base Sample Questions

Question B3: What will the dataset WORK.COLORS look like ?

CRAYONS.TXT

```
----+----1----+----2----+----
RED    ORANGE  YELLOW  GREEN
BLUE   INDIGO  PURPLE  VIOLET
CYAN   WHITE   FUCSIA  BLACK
GRAY   BROWN   PINK    MAGENTA
```

```
data  work.colors;
    infile  'CRAYONS.TXT';
    input @1 Var1 $  @8 Var2 $ @;
    input @1 Var3 $  @8 Var4 $ @;
run;
```

A.

Var1	Var2	Var3	Var4
RED	ORANGE	RED	ORANGE
BLUE	INDIGO	BLUE	INDIGO
CYAN	WHITE	CYAN	WHITE
GRAY	BROWN	GRAY	BROWN

B.

Var1	Var2	Var3	Var4
RED	ORANGE	BLUE	INDIGO
CYAN	WHITE	GRAY	BROWN

C.

Var1	Var2	Var3	Var4
RED	ORANGE	YELLOW	GREEN
BLUE	INDIGO	PURPLE	VIOLET

D.

Var1	Var2	Var3	Var4
RED	ORANGE	YELLOW	GREEN
BLUE	INDIGO	PURPLE	VIOLET
CYAN	WHITE	FUCSIA	BLACK
GRAY	BROWN	PINK	MAGENTA

Exam Preparation – Base Sample Questions

Question B4:

```
data  work.one   work.two;
   set work.input;
   if Var1 = 'A' then output work.one;
   output;
run;
```

Work.INPUT

Var1	Var2
A	one
A	two
B	three
C	four
A	five

B4a. How many observations will be in dataset work.one?

B4b. How many observations will be in dataset work.two?

The correct Answer to B4a. is 8

The correct Answer to B4b. is 5

Exam Preparation – **Base** Sample Questions

Question B5: Supply the missing line of code.

```
data  work.qtr1;
   set work.sales;
   array  month {3}  Jan  Feb  Mar;
   < insert code here >
run;
```

Work.SALES

SalesID	Jan	Feb	Mar
W6790	50	400	350
W7693	25	100	125
W1387	.	300	250

Which statement should be inserted to create WORK.QTR1 ?

A. Qtr1=sum (of month { _ALL _ }) ;
B. Qtr1=sum (of month1 – month3) ;
C. Qtr1=sum (of month{ * }) ;
D. Qtr1=Jan + Feb + Mar ;

Work.QTR1

SalesID	Jan	Feb	Mar	Qtr1
W6790	50	400	350	800
W7693	25	100	125	250
W1387	.	300	250	550

Exam Preparation – **Advanced** Sample Questions

Question A1:

```
proc sql;
   select one.*, sales
   from one right join two
   on one.year = two.year ;
quit ;
```

Which one of the following reports is generated?

Work.ONE

Year	Qtr	Budget
2001	3	500
2001	4	400
2002	1	700

Work.TWO

Year	Qtr	Sales
2001	4	300
2002	1	600

A.

Year	Qtr	Budget	Sales
2001	3	500	.

B.

Year	Qtr	Budget	Sales
2001	4	400	300
2002	1	700	600

C.

Year	Qtr	Budget	Sales
2001	3	500	.
2001	4	400	300
2002	1	700	600

D.

Year	Qtr	Budget	Sales
2001	3	500	300
2001	4	400	300
2002	1	700	600

Exam Preparation – **Advanced** Sample Questions

Question A2:

The following DATA step was submitted to create WORK.THREE.

```
data work.three;
    merge work.one (in = a)
          work.two (in = b);
    by num ;
run;
```

Which one of the SQL programs on the next page creates an equivalent SAS data set THREE?

Work.ONE

Num	Char_1
1	A
2	B
4	C

Work.TWO

Num	Char_2
2	X
3	Y
5	Z

Work.THREE

Num	Char_1	Char_2
1	A	
2	B	X
3		Y
4	D	
5		Z

Q A2:

Work.ONE

Num	Char_1
1	A
2	B
4	C

Work.TWO

Num	Char_2
2	X
3	Y
5	Z

Work.THREE

Num	Char_1	Char_2
1	A	
2	B	X
3		Y
4	C	
5		Z

```
*A; proc sql;
      create table three as
      select *
      from one full join two
      where one.num = two.num;
    quit ;

*B; proc sql;
      create table three as
      select coalesce (one.num, two.num)
            as Num,  char_1, char_2
      from one full join two
      where one.num = two.num;
    quit ;
```

```
*C; proc sql;
      create table three as
       select one.num, char_1, char_2
       from one full join two
       on  one.num = two.num;
    quit ;

*D; proc sql;
      create table three as
      select coalesce (one.num, two.num)
            as Num,  char_1, char_2
      from one full join two
      on one.num = two.num;
    quit ;
```

Exam Preparation – **Advanced** Sample Questions

Question A3:

The SASDATA.SALES data set has a simple index on the variable DATE and a variable named REVENUE with no index. Which one of the following SAS programs is the DATE index considered for use?

```
* A. proc print data = sasdata.sales;
       by date;
   run;
* B. proc print data = sasdata.sales;
       where year (date) = 2013;
   run;
* C. data may;
       set sasdata.sales;
       where date < '01may2012'd and revenue < 99000 ;
   run;
*D.;data june;
       set sasdata.sales;
       if '01jun2013'd < date < '31jun2013'd ;
   run;
```


Exam Preparation – **Advanced** Sample Questions

Question A4: Which of the following examples defines a macro program named **OUT** that includes parameters **AGE** and **TOTAL** ?

```
* A.; %macro out ( age, total);
        proc print data = sales;
             var age total;
        run;
     %mend out;

* B.; %macro out ('age', 'total');
        proc print data = sales;
             var &age &total;
        run;
     %mend out;

* C.; %macro out ( age, total);
        proc print data = sales;
             var &age &total;
        run;
     %mend out;
```

About the Speaker

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