SAS® Programming 1: Essentials

Lesson Quizzes

Lesson Quizzes

1.1 Quizzes

Lesson 1 – Essentials

1. How many steps does this program contain?

   a. one

   b. two

   c. four

   d. eight

```
data national;
    set sashelp.baseball;
    BatAvg=nHits/nAtBat;
run;

proc contents data=national;
run;

proc print data=national;
run;

proc means data=national;
    var BatAvg;
run;
```

3

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2. Running a SAS program can create which of the following?

   a. log

   b. output data

   c. results

   d. all of the above

5

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3. Which of the following is a SAS syntax requirement?

a. Begin each statement in column one.
b. Put only one statement on each line.
c. Separate each step with a line space.
d. End each statement with a semicolon.

4. How many statements does this program contain?

a. five
b. six
c. seven
d. eight

```
*Create a cars report;

title "European Cars Priced Over 30K";
footnote "Internal Use Only";

proc print data=sashelp.cars;
    where Origin='Europe'
        and MSRP>30000;
    var Make Model Type
        Mpg_City Mpg_Highway;
run;
```

5. Which of the following steps is typically used to generate reports and graphs?

   a. DATA

   b. PROC

   c. REPORT

   d. RUN

SAS

6. Does this comment contain syntax errors?

```
 /*
Report created for budget
presentation; revised October 15.
  */
proc print data=work.newloan;
run;
```

   a. No. The comment is correctly specified.

   b. Yes. Every comment line must end with a semicolon.

   c. Yes. The comment is on more than one line.

   d. Yes. There is a semicolon in the middle of the comment.

SAS

7. What result would you expect from submitting this step?

```
proc print data=work.newsalesemps
run;
```

a. a report of the **work.newsalesemps** data set
b. an error message in the log
c. the creation of a table named **work.newsalesemps**

8. What happens if you submit the following program?

```
porc print data=work.newsalesemps;
run;
```

a. SAS does not execute the step.
b. SAS assumes that PROC is misspelled and executes the step.

9. This program contains a syntax error because National is in different cases.

```
data national;
     set sashelp.baseball;
     BatAvg=nHits/nAtBat;
run;

proc means data=NATIONAL;
     var BatAvg;
run;
```

a. True

b. False

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10. Which of the following is not a SAS programming interface?

a. SAS Enterprise Guide

b. SAS Manager

c. SAS Studio

d. SAS windowing environment

§sas

Lesson 2 – Accessing Data

1. In this PROC CONTENTS output, what is the default length of the **Birth_Date** column?

   a. 4 bytes

   b. 8 bytes

   c. 32,767 bytes

   d. It does not have a default length.

#	Variable	Type
4	Birth_Date	Num
3	Customer_Address	Char
1	Customer_ID	Num
2	Customer_Name	Char

2. Which LIBNAME statement has the correct syntax?

   a. `libname reports "filepath/workshop";`

   b. `libname orion filepath/workshop;`

   c. `libname 3456a "filepath/workshop";`

3. Which of the following tables is available at the beginning of a new SAS session?

a. sales
b. work.newsalesemps
c. sashelp.class

SAS

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4. In this table, what type of column is **Employee_ID**?

a. character
b. numeric
c. temporary
d. missing

Obs	Employee_ID	Last	Salary
1	.	Ralston	29250
2	120101	Lu	163040
3	120104	Billington	46230
4	120105	Povey	27110
5	120106	Hornsey	.

SAS

5. Which statement about SAS dates is false?

a. A SAS date is one of three of SAS column types: numeric, character, and date.
b. SAS dates represent the number of days from January 1, 1960.
c. SAS date values can be positive or negative.
d. SAS date values can be used in calculations.

§sas

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6. Which LIBNAME statement has the correct syntax for reading a Microsoft Excel file?

a. `libname excel "filepath/myexcelfile";`
b. `libname mydata xlsx "filepath/myexcelfile";`
c. `libname mydata xlsx "filepath/field_data.xlsx";`

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7.   Which library name (libref) is valid?

a.   `2010Car`
b.   `car/2010`
c.   `car2010`
d.   `cars_2010`

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8.   To disassociate a libref that you previously assigned, you can use the UNASSIGN option in the LIBNAME statement.

a.   True
b.   False

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9. What does this code do?

```
proc import datafile="d:/collect817/bird_count.csv"
            dbms=csv out=bird817 replace;
run;
```

a. It creates a SAS table named **Bird817** in the **Work** library from the CSV file **bird_count** and replaces **Bird817** whenever the CSV file is updated.

b. It creates a SAS table named **Bird817** in the **Work** library from the CSV file **bird_count**.

c. It uses the CSV engine to directly read the data file **bird_count.csv**.

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10. In which portion of a SAS table are the following found?

- name of the table
- type of the column **Salary**
- creation date of the table

a. descriptor portion

b. data portion

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Lesson 3 – Exploring and Validating Data

1. Which of the following is a valid name for a character format?
a. country
b. $ctry
c. $country.
d. _country

45

2. Which of the following FORMAT statements was used to create this output?

Obs	Order_ID	Order_Date	Delivery_Date
1	1230058123	11JAN07	01/11/07
2	1230080101	15JAN07	01/19/07
3	1230106883	20JAN07	01/22/07
4	1230147441	28JAN07	01/28/07
5	1230315085	27FEB07	02/27/07

a. `format Order_Date date9. Delivery_Date mmddyy8.;`
b. `format Order_Date date7. Delivery_Date mmddyy8.;`
c. `format Order_Date ddmmmyy. Delivery_Date mmddyy8.;`
d. `format Order_Date monyy7. Delivery_Date mmddyy8.;`

47

3. The format name must include a period delimiter in the FORMAT statement.

   a. True

   b. False

4. Which row or rows are selected by the following WHERE statement?

```
where Job_Title like "Sales%";
```

Obs	Last_Name	First_Name	Country	Job_Title
1	Wu	Christine	AU	Sales Rep I
2	Stone	Kimiko	AU	Sales Manager
3	Hoffman	Fred	AU	Insurance Sales

   a. row 1

   b. row 2

   c. row 3

   d. rows 1 and 2

   e. all rows

5. Which statement about this PROC SORT step is true?

```
proc sort data=orion.staff;
          out=work.staff;
     by descending Salary Manager_ID;
run;
```

a. The sorted table overwrites the input table.

b. The rows are sorted by **Salary** in descending order, and then by **Manager_ID** in descending order.

c. A semicolon should not appear after the input table name.

d. The sorted table contains only the columns specified in the BY statement.

53

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6. Which of the following statements selects from a table only those rows where the value of the **Style** column is *RANCH*, *SPLIT*, or *TWOSTORY*?

a. `where Style='RANCH' or 'SPLIT' or 'TWOSTORY';`

b. `where Style in 'RANCH' or 'SPLIT' or 'TWOSTORY';`

c. `where Style in (RANCH, SPLIT, TWOSTORY);`

d. `where Style in ('RANCH', 'SPLIT', 'TWOSTORY');`

55

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7. Which of the following statements selects rows in which **Amount** is less than or equal to *$5,000* or **Rate** equals *0.095*?

a. `where amount <= 5000 or rate=0.095;`

b. `where amount le 5000 or rate=0.095;`

c. `where amount <= 5000 or rate eq 0.095;`

d. all of the above

57

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8. Which statement creates the macro variable **flower** and assigns the value *Plumeria*?

a. `%let flower=Plumeria;`

b. `%let flower="Plumeria";`

c. `%let &flower=Plumeria;`

d. `%let &flower="Plumeria";`

59

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9. Which statement in a PROC MEANS step enables you to specify the numeric columns to analyze?

   a. TABLES
   b. VARS
   c. VAR
   d. KEEP=

10. If you have a table that includes flower sales to all your retail outlets. You want to see the distinct values of Flower_Type with a count and percentage for each. Which procedure would you use?

    a. PRINT
    b. MEANS
    c. UNIVARIATE
    d. FREQ

Lesson 4 – Preparing Data

1. In which phase does the DATA step check for syntax errors?

a. compilation
b. execution

2. What statement is used to read a SAS data set in a DATA step?

a. DATA statement
b. WHERE statement
c. SET statement
d. assignment statement

3. To process an Excel file with the DATA step, you must first create a copy of the data as a SAS table.

a. True
b. False

SAS

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4. What is the name of the output data set in the program below?

```
data work.us;
    set orion.sales;
    where Country='US';
run;
```

a. work.us
b. orion.sales
c. Country
d. sales

SAS

5. The data set **orion.sales** contains nine columns. Given this DATA step, how many columns does **work.comp** contain?

```
data work.comp;
    set orion.sales;
    keep employee_id gender job_title salary;
run;
```

a. four

b. nine

c. five

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6. Given the assignment statement below, what is the value of **AvgExp** for the observation that is shown?

```
AvgExp=mean(Exp1, Exp2, Exp3, Exp4);
```

a. 6

b. 8

c. . (missing value)

d. The statement generates a syntax error.

Exp1	Exp2	Exp3	Exp4
10	.	5	9

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7. Which of the following SAS functions returns a number from 1 to 12?

a. YEAR(*SAS-date-value*)

b. MONTH(*SAS-date-value*)

c. WEEKDAY(*SAS-date-value*)

d. none of the above

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8. In the program below, what is the value of **Credit** if **Country** is '*au*'?

```
data work.bonus;
    set orion.sales;
    if Country='US' then Credit=300;
    else if Country='AU' then Credit=500;
    else Credit=0;
run;
```

a. 300

b. 500

c. 0

d. missing

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9. What is the length of the **Car_Type** column created in this program?

```
data car_type;
    set sashelp.cars;
    if msrp>80000 then car_type="luxury";
    else car_type="regular";
    length car_type $ 8;
run;
```

a. 6

b. 7

c. 8

§sas

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10. Use a DO group in a DATA step when you want to execute multiple statements for a true IF-THEN expression.

a. True

b. False

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Lesson 5 – Analyzing and Reporting on Data

1. If you run this program, which title or titles appear in the final PROC PRINT results?

   a. The Top Line

   b. The Top Line
      The Next Line

   c. The Top Line
      The Second Line

   d. The Top Line
      The First Line
      The Next Line

```
title1 'The First Line';
title2 'The Second Line';
proc print data=sales;
run;
title2 'The Next Line';
proc print data=sales;
run;
title 'The Top Line';
proc print data=sales;
run;
```

87

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2. Which statement substitutes the value of the macro variable `Year` in the footnote?

```
%let Year=2018;
```

   a. `footnote 'year Sales';`

   b. `footnote '&year Sales';`

   c. `footnote "%year Sales";`

   d. `footnote "&year Sales";`

89

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3. Which statement is true based on the given program?

a. The column *BatAvg* will have a permanent label in the *sashelp.baseball* table.

b. The label for *BatAvg* will appear in the PRINT report.

c. The label for *BatAvg* will appear in the MEANS report.

d. The label for *BatAvg* will appear in both reports.

```
data baseball2;
    set sashelp.baseball;
    BatAvg=CrHits/CrAtBat;
    label BatAvg="Batting Average";
run;

proc print data=baseball2;
    var Name Team BatAvg;
run;

proc means data=baseball2;
    var BatAvg;
    class Team;
run;
```

91

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4. Which statement is true regarding a BY statement in a reporting procedure such as PROC PRINT?

a. The BY statement is responsible for sorting the table.

b. Only one column can be specified in the BY statement.

c. The BY statement groups the report by the specified columns.

d. The BY statement must be the first statement after the PROC statement.

93

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5. Which statement is false concerning the FREQ procedure?

a. The NOPROCTITLE option can be placed in the PROC FREQ statement to remove the procedure title of **The FREQ Procedure**.

b. The ORDER=FREQ option can be placed in the PROC FREQ statement to display the column values in descending frequency count order.

c. The PLOTS= option can be placed in the TABLES statement after the forward slash to create bar charts based on counts or percentages.

d. The OUT= option can be placed in the TABLES statement after the forward slash to create a table containing counts and percentages.

95

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6. Which PROC FREQ step creates the results shown here?

a.
```
proc freq data=sashelp.shoes;
    tables Region nocum;
run;
```

b.
```
proc freq data=sashelp.shoes levels;
    tables Region / nocum;
run;
```

c.
```
proc freq data=sashelp.shoes nlevels;
    tables Region / nocum;
run;
```

d.
```
proc freq data=sashelp.shoes / levels;
    tables Region nocum;
run;
```

Number of Variable Levels	
Variable	Levels
Region	10

Region	Frequency	Percent
Africa	56	14.18
Asia	14	3.54
Canada	37	9.37
Central America/Caribbean	32	8.10
Eastern Europe	31	7.85
Middle East	24	6.08
Pacific	45	11.39
South America	54	13.67
United States	40	10.13
Western Europe	62	15.70

97

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7. Which report is created from the following PROC FREQ step?

```
proc freq data=sashelp.cars;
    where Cylinders in (4,6) and Type in ('Sedan','SUV');
    tables Type*Cylinders / nocol norow crosslist;
run;
```

a.

Frequency Percent	Table of Type by Cylinders		
	Cylinders		
	Type	4	6	Total
	SUV	7	30	37
		2.77	11.86	14.62
	Sedan	96		

b.

Type	Cylinders	Frequency	Percent	Cumulative Frequency	Cumulative Percent
SUV	4	7	2.77	7	2.77
SUV	6	30	11.86	37	14.62
Sedan		96	37.94	133	52.57

c.

Table of Type by Cylinders

Type	Cylinders	Frequency	Percent
SUV	4	7	2.77
	6	30	11.86
	Total	37	14.62

d.

Table of Type by Cylinders

Type	Cylinders	Frequency	Percent	Row Percent	Column Percent
SUV	4	7	2.77	18.92	6.80
	6	30	11.86	81.08	20.00
	Total	37	14.62	100.00	

8. Which statement is true concerning the MEANS procedure?

a. The VAR statement is required and identifies the analysis columns.

b. The WAYS statement specifies the number of ways to make unique combinations of class columns.

c. The MAXDEC= option is used in the VAR statement to specify the number of decimal places for the statistics.

d. The _COUNT_ and _FREQ_ columns are automatically included in the output summary table that is produced by the OUT= option of the OUTPUT statement.

9. The input table must be pre-sorted by the columns listed
   in the CLASS statement of a PROC MEANS step.

a. True

b. False

```
proc means data=sashelp.heart;
    var Cholesterol;
    class Weight_Status Sex;
run;
```

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10. Which statement from PROC MEANS contains valid syntax
    for creating a summary output table?

a. `out=work.summary mean;`

b. `out work.summary mean(Weight)=TotW;`

c. `output out work.summary Weight=TotW;`

d. `output out=work.summary mean(Weight)=TotW;`

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Lesson 6 – Exporting Results

1. Which statement is false concerning the options for the PROC EXPORT statement?

   a. The DATA= option identifies the input SAS table.

   b. The REPLACE option specifies to overwrite an existing file.

   c. The DBMS= option specifies the database identifier for the type of file being created.

   d. The OUT= option specifies the path and file name of the external data file being created.

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2. Which PROC EXPORT step contains valid syntax?

   a.
   ```
   proc export outfile="c:\temp\cars.txt" tab
               data=sashelp.cars replace; run;
   ```

   b.
   ```
   proc export data=sashelp.cars dbms=csv
               outfile="c:\temp\cars.csv"; run;
   ```

   c.
   ```
   proc export data=sashelp.class; dbms=csv;
               outfile="c:\temp\cars.csv"; run;
   ```

   d.
   ```
   proc export dbms=tab data=sashelp.cars replace=yes
               outfile="c:\temp\cars.txt"; run;
   ```

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3. What does the following program create?

```
libname sales xlsx 'c:\mydata\midyear.xlsx';

data sales.q1_2018;
    set sasdata.qtr1_2018;
run;
data sales.q2_2018;
    set sasdata.qtr2_2018;
run;
```

a. two SAS tables: sales.q1_2018 and sales.q2_2018
b. two Excel workbooks: sales.q1_2018 and sales.q2_2018
c. two worksheets in the Excel workbook: midyear: q1_2018 and q2_2018
d. two worksheets in the Excel workbook: sales: q1_2018 and q2_2018

§sas

4. Which statement disassociates the sales libref?

```
libname sales xlsx 'c:\mydata\midyear.xlsx';
```

a. `libname sales end;`
b. `libname sales clear;`
c. `libname sales close;`
d. `libname sales disassociate;`

§sas

5. What type of output file does this program create?

```
libname mylib xlsx "s:/workshop/output/test.xlsx";

data class_list;
    set sashelp.class;
run;
```

a. SAS table

b. delimited file

c. Microsoft Excel XLS file

d. Microsoft Excel XLSX file

6. Which of these programs creates a Microsoft Excel file?

a.
```
ods excel file="s:/workshop/output/class.xlsx";
proc print data=sashelp.class;
run;
ods excel close;
```

b.
```
libname mylib xlsx "s:/workshop/output/class.xlsx";
data mylib.class_list;
    set sashelp.class;
run;
```

c. both

d. neither

7. Which of the following is not a valid ODS statement?

a. `ods csvall file='c:\temp\myfile.csv';`

b. `ods pdf file='c:\temp\myfile.pdf';`

c. `ods powerpoint file='c:\temp\myfile.ppt';`

d. `ods word file='c:\temp\myfile.doc';`

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8. What statement needs to be added to the end of this program?

```
ods pdf file='c:\temp\myfile.pdf';

proc print data=sashelp.class;
run;
```

a. `ods clear;`

b. `ods close;`

c. `ods pdf clear;`

d. `ods pdf close;`

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9. Which statement is false concerning the options for the ODS statement?

a. The STYLE= option names the desired font.
b. The FILE= option specifies the output file to create.
c. The STRARTPAGE= controls the behavior of page breaks.
d. The PDFTOC= option controls the level of the expansion of the table of contents in PDF documents.

124

10. Which statement contains valid syntax for specifying a worksheet name?

a. `ods excel sheet_name='Males';`
b. `ods excel (sheet_name='Males');`
c. `ods excel option(sheet_name='Males');`
d. `ods excel options(sheet_name='Males');`

126

Lesson 7 – Using SQL in SAS

1. What is the correct order of the following four clauses?

a.
```
from ...
  select ...
    where ...
      order by ...
```

b.
```
order by ...
  from ...
    select ...
      where ...
```

c.
```
select ...
  where ...
    order by ...
      from ...
```

d.
```
select ...
  from ...
    where ...
      order by ...
```

129

2. Which of the following is false regarding the SQL procedure?

a. Column names are separated with commas.

b. The procedure ends with a QUIT statement.

c. Formats can be specified in the FROM clause.

d. The SELECT and FROM clauses are required in the SELECT statement.

131

3. Which syntax is valid for creating a computed column in the SELECT clause?

a. **Ratio = Height/Weight**

b. **Ratio as Height/Weight**

c. **Height/Weight = Ratio**

d. **Height/Weight as Ratio**

4. The SELECT statement creates a report. Which clause can be added before the SELECT clause to create a table?

a. **create work.new =**

b. **create work.new table**

c. **create table work.new as**

d. **create table=work.new as**

5. Which SELECT statement produces the given output?

Name	Height
Thomas	57.5
Joyce	51.3

a.
```
select Name Height
    from sashelp.class
    where age=12
    order by Height;
```

b.
```
select Name, Height
    from sashelp.class
    where age=12
    order by Height desc;
```

c.
```
select Name Height
    from sashelp.class
    where age=12
    order by desc Height;
```

d.
```
select Name, Height
    from sashelp.class
    where age=12
    order by desc Height;
```

137

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6. Which SQL statement can delete tables?

a. DROP

b. VOID

c. DELETE

d. SELECT

139

§sas

7. If an inner join is performed on the following tables based on the **ID** and **IDNO** columns, how many rows will be in the PROC SQL report?

⚠ Name	🔢 ID
Jack	111
Mary	333
Jane	555

🔢 IDNO	🔢 Salary
111	75000
222	83000
333	82000

a. one

b. two

c. three

d. four

§sas

---

8. Which statement has the correct syntax for performing an inner join?

a.
```
select ID, Name, Salary
    from one join two
    on ID=IDNO;
```

b.
```
select ID, Name, Salary
    from one join two
    where ID=IDNO;
```

c.
```
select ID, Name, Salary
    from one inner join two
    on ID=IDNO;
```

d.
```
select ID, Name, Salary
    from one inner join two
    where ID=IDNO;
```

§sas

9. Which ON clause has valid qualifying syntax?

a.
```
from empsau inner join phonec
    on e.empid=p.empid;
```

b.
```
from empsau inner join phonec
    on left.empid=right.empid;
```

c.
```
from empsau inner join phonec
    on first.empid=second.empid;
```

d.
```
from empsau inner join phonec
    on empsau.empid=phonec.empid;
```

§sas

10. Which FROM clause is properly creating aliases?

a.
```
from empsau=e inner join phonec=p
```

b.
```
from empsau(e) inner join phonec(p)
```

c.
```
from empsau as e inner join phonec as p
```

d.
```
from empsau of e inner join phonec of p
```

§sas

1.2 Solutions

Lesson 1

1. How many steps does this program contain?

   a. one
   b. two
   c. four
   d. eight

   ```
   data national;
       set sashelp.baseball;
       BatAvg=nHits/nAtBat;
   run;

   proc contents data=national;
   run;

   proc print data=national;
   run;

   proc means data=national;
       var BatAvg;
   run;
   ```

   4

   §sas

RUN, QUIT, DATA, and PROC statements function as step boundaries, which determine when SAS statements take effect and indicate the end of the current step or the beginning of a new step.

2. Running a SAS program can create which of the following?

   a. log
   b. output data
   c. results
   d. all of the above

   6

   §sas

A SAS program will always create a log. A program can create output data and results as well, depending on steps included.

---

3. Which of the following is a SAS syntax requirement?

   a. Begin each statement in column one.

   b. Put only one statement on each line.

   c. Separate each step with a line space.

  (d.) End each statement with a semicolon.

8

§sas

All SAS statements must end with a semicolon, but they are free-format. You can begin or end them anywhere, separate steps with line spaces, and optionally end steps with a RUN statement.

---

4. How many statements does this program contain?

   a. five

   b. six

  (c.) seven

   d. eight

```
*Create a cars report;

title "European Cars Priced Over 30K";
footnote "Internal Use Only";

proc print data=sashelp.cars;
   where Origin='Europe'
         and MSRP>30000;
   var Make Model Type
       Mpg_City Mpg_Highway;
run;
```

10

§sas

This program contains seven statements (seven semi-colons): 1. comment, 2. TITLE, 3. FOOTNOTE, 4. PROC, 5. WHERE (two lines), 6. VAR (two lines), and 7. RUN.

5. Which of the following steps is typically used to generate reports and graphs?

   a. DATA
   b. PROC
   c. REPORT
   d. RUN

§sas

PROC steps are typically used to process SAS data sets (that is, generate reports, graphs, and statistics).

6. Does this comment contain syntax errors?

```
 /*
Report created for budget
presentation; revised October 15.
  */
proc print data=work.newloan;
run;
```

   a. No. The comment is correctly specified.
   b. Yes. Every comment line must end with a semicolon.
   c. Yes. The comment is on more than one line.
   d. Yes. There is a semicolon in the middle of the comment.

§sas

A block comment can contain semicolons and unbalanced quotation marks, can appear anywhere, and doesn't need a semicolon at the end.

7. What result would you expect from submitting this step?

```
proc print data=work.newsalesemps
run;
```

a. a report of the **work.newsalesemps** data set

(b.) an error message in the log

c. the creation of a table named **work.newsalesemps**

§sas

There is a missing semicolon following the data set name. When this step runs, SAS will interpret the word run as an option in the PROC PRINT statement (because of the missing semicolon). As a result, the PROC PRINT step will not execute and an error message will be displayed in the log.

8. What happens if you submit the following program?

```
porc print data=work.newsalesemps;
run;
```

a. SAS does not execute the step.

(b.) SAS assumes that PROC is misspelled and executes the step.

§sas

The log will indicate that SAS assumed that the keyword PROC was misspelled, corrected it temporarily, and executed the PROC step.

9. This program contains a syntax error because **National** is in different cases.

```
data national;
    set sashelp.baseball;
    BatAvg=nHits/nAtBat;
run;

proc means data=NATIONAL;
    var BatAvg;
run;
```

a. True

b. False

20

§sas

Case does not matter in unquoted values, so in this case, the data set name can be in specified in any case.

10. Which of the following is not a SAS programming interface?

a. SAS Enterprise Guide

b. SAS Manager

c. SAS Studio

d. SAS windowing environment

22

§sas

The programming interfaces include SAS Enterprise Guide (client application), SAS Studio (web-based), and SAS windowing environment. There is not an interface/product called SAS Manager.

Lesson 2

1. In this PROC CONTENTS output, what is the default length of the **Birth_Date** column?

a. 4 bytes
b. 8 bytes
c. 32,767 bytes
d. It does not have a default length.

#	Variable	Type
4	Birth_Date	Num
3	Customer_Address	Char
1	Customer_ID	Num
2	Customer_Name	Char

§sas

Birth_Date is a numeric column, and all numeric columns in SAS are 8 bytes by default.

2. Which LIBNAME statement has the correct syntax?

a. `libname reports "filepath/workshop";`
b. `libname orion filepath/workshop;`
c. `libname 3456a "filepath/workshop";`

§sas

The libref must start with a letter or an underscore and contain eight characters maximum. The path must also be in quotation marks.

3. Which of the following tables is available at the beginning of a new SAS session?

a. sales
b. work.newsalesemps
c. sashelp.class

29

SAS

The **Sashelp** library contains sample and resource tables provided by SAS. The library is automatically available when SAS starts.

4. In this table, what type of column is **Employee_ID**?

a. character
b. numeric
c. temporary
d. missing

Obs	Employee_ID	Last	Salary
1	.	Ralston	29250
2	120101	Lu	163040
3	120104	Billington	46230
4	120105	Povey	27110
5	120106	Hornsey	.

31

SAS

Missing numeric values are represented with a period, so **Employee_ID** must be a numeric column.

5. Which statement about SAS dates is false?

a. A SAS date is one of three of SAS column types: numeric, character, and date.

b. SAS dates represent the number of days from January 1, 1960.

c. SAS date values can be positive or negative.

d. SAS date values can be used in calculations.

Ⓢsas

SAS columns are either character or numeric. SAS date values are numeric values that represent the number of days before or after January 1, 1960.

6. Which LIBNAME statement has the correct syntax for reading a Microsoft Excel file?

a. `libname excel "filepath/myexcelfile";`

b. `libname mydata xlsx "filepath/myexcelfile";`

c. `libname mydata xlsx "filepath/field_data.xlsx";`

Ⓢsas

After the libref, the XLSX engine is specified. The full path to the Excel file, including the .xlsx file extension, must be provided in quotation marks.

7. Which library name (libref) is valid?

a. `2010Car`
b. `car/2010`
c. `car2010`
d. `cars_2010`

This libref follows all three rules for valid librefs. A libref must have a length of one to eight characters, and must begin with a letter or underscore. The remaining characters must be letters, numbers, or underscores.

8. To disassociate a libref that you previously assigned, you can use the UNASSIGN option in the LIBNAME statement.

a. True
b. False

Use the CLEAR option in the LIBNAME statement to disassociate an assigned libref.

9. What does this code do?

```
proc import datafile="d:/collect817/bird_count.csv"
            dbms=csv out=bird817 replace;
run;
```

a. It creates a SAS table named **Bird817** in the **Work** library from the CSV file **bird_count** and replaces **Bird817** whenever the CSV file is updated.

b. It creates a SAS table named **Bird817** in the **Work** library from the CSV file **bird_count**.

c. It uses the CSV engine to directly read the data file **bird_count.csv**.

41

§sas

This PROC IMPORT step creates a SAS table from a CSV file. When the code runs, it replaces the SAS table if it already exists.

10. In which portion of a SAS table are the following found?
- name of the table
- type of the column **Salary**
- creation date of the table

a. descriptor portion

b. data portion

43

§sas

The descriptor portion of a SAS table includes the table metadata.

Lesson 3

---

1. Which of the following is a valid name for a character format?

a. country

b. $ctry

c. $country.

d. _country

§sas

Character formats must start with a dollar sign followed by a letter or underscore. A format name does not end with a period. The period is a required delimiter when using a format in a FORMAT statement.

---

2. Which of the following FORMAT statements was used to create this output?

Obs	Order_ID	Order_Date	Delivery_Date
1	1230058123	11JAN07	01/11/07
2	1230080101	15JAN07	01/19/07
3	1230106883	20JAN07	01/22/07
4	1230147441	28JAN07	01/28/07
5	1230315085	27FEB07	02/27/07

a. `format Order_Date date9. Delivery_Date mmddyy8.;`

b. `format Order_Date date7. Delivery_Date mmddyy8.;`

c. `format Order_Date ddmmmyy. Delivery_Date mmddyy8.;`

d. `format Order_Date monyy7. Delivery_Date mmddyy8.;`

§sas

The DATE7. format displays a two-digit day, three-letter month abbreviation, and two-digit year. The MMDDYY8. format displays a two-digit month, day, and year, separated by slashes.

3. The format name must include a period delimiter in the FORMAT statement.

a.) True

b. False

§sas

The period is a required syntax element in a format name within a FORMAT statement.

4. Which row or rows are selected by the following WHERE statement?

```
where Job_Title like "Sales%";
```

Obs	Last_Name	First_Name	Country	Job_Title
1	Wu	Christine	AU	Sales Rep I
2	Stone	Kimiko	AU	Sales Manager
3	Hoffman	Fred	AU	Insurance Sales

a. row 1

b. row 2

c. row 3

d.) rows 1 and 2

e. all rows

§sas

This WHERE statement returns rows that contain Sales with any number of additional characters after "Sales" because of the position of the percent sign.

5. Which statement about this PROC SORT step is true?

```
proc sort data=orion.staff;
          out=work.staff;
     by descending Salary Manager_ID;
run;
```

a. The sorted table overwrites the input table.

b. The rows are sorted by Salary in descending order, and then by Manager_ID in descending order.

c. A semicolon should not appear after the input table name.

d. The sorted table contains only the columns specified in the BY statement.

54

§sas

This PROC SORT step has a syntax error: a semicolon in the middle of the PROC SORT statement. If you correct this syntax error, this step sorts **orion.staff** by *Salary* in descending order and by **Manager_ID** in ascending order. The step then creates the temporary data set **staff** that contains the sorted rows and all columns.

6. Which of the following statements selects from a table only those rows where the value of the Style column is *RANCH*, *SPLIT*, or *TWOSTORY*?

a. `where Style='RANCH' or 'SPLIT' or 'TWOSTORY';`

b. `where Style in 'RANCH' or 'SPLIT' or 'TWOSTORY';`

c. `where Style in (RANCH, SPLIT, TWOSTORY);`

d. `where Style in ('RANCH', 'SPLIT', 'TWOSTORY');`

56

§sas

In the WHERE statement, the IN operator enables you to select rows based on several values. You specify values in parentheses and separate them with spaces or commas. Character values must be enclosed in quotation marks and must be in the same case as in the data set.

7. Which of the following statements selects rows in which **Amount** is less than or equal to *$5,000* or **Rate** equals *0.095*?

    a. `where amount <= 5000 or rate=0.095;`
    b. `where amount le 5000 or rate=0.095;`
    c. `where amount <= 5000 or rate eq 0.095;`
    d. all of the above

§sas

All of the statements shown here select rows in which **Amount** is less than or equal to *$5000* or **Rate** equals *0.095*.

8. Which statement creates the macro variable **flower** and assigns the value *Plumeria*?

    a. `%let flower=Plumeria;`
    b. `%let flower="Plumeria";`
    c. `%let &flower=Plumeria;`
    d. `%let &flower="Plumeria";`

§sas

In the %LET statement, the name of the macro variable is followed by an equal sign and the unquoted value. The ampersand is added when you use the macro variable.

9. Which statement in a PROC MEANS step enables you to specify the numeric columns to analyze?

a. TABLES
b. VARS
c. VAR
d. KEEP=

§sas

You use the VAR statement to specify the numeric columns to analyze in PROC MEANS. If you don't specify the VAR statement, all numeric columns are analyzed.

10. If you have a table that includes flower sales to all your retail outlets. You want to see the distinct values of **Flower_Type** with a count and percentage for each. Which procedure would you use?

a. PRINT
b. MEANS
c. UNIVARIATE
d. FREQ

§sas

PROC FREQ output includes the distinct values for the column and a frequency count, percent, and cumulative frequency and percent.

Lesson 4

1. In which phase does the DATA step check for syntax errors?

a. compilation
b. execution

Checking for syntax errors is the first step in the compilation phase.

2. What statement is used to read a SAS data set in a DATA step?

a. DATA statement
b. WHERE statement
c. SET statement
d. assignment statement

The SET statement indicates the table that will be read. The DATA statement indicates the table that will be created or updated.

3. To process an Excel file with the DATA step, you must first create a copy of the data as a SAS table.

a. True
b. False

§sas

You can use the XLSX LIBNAME engine to read an Excel worksheet directly and process the data with the DATA step.

4. What is the name of the output data set in the program below?

```
data work.us;
    set orion.sales;
    where Country='US';
run;
```

a. work.us
b. orion.sales
c. Country
d. sales

§sas

The output table is listed in the DATA statement.

5. The data set **orion.sales** contains nine columns. Given this DATA step, how many columns does **work.comp** contain?

```
data work.comp;
    set orion.sales;
    keep employee_id gender job_title salary;
run;
```

a. four

b. nine

c. five

§sas

Only the four columns listed in the KEEP statement are written to the **work.comp** table.

6. Given the assignment statement below, what is the value of **AvgExp** for the observation that is shown?

```
AvgExp=mean(Exp1, Exp2, Exp3, Exp4);
```

a. 6

b. 8

c. . (missing value)

d. The statement generates a syntax error.

Exp1	Exp2	Exp3	Exp4
10	.	5	9

§sas

The MEAN function ignores missing values, so the calculation is (10+5+9)/3=8.

7. Which of the following SAS functions returns a number from 1 to 12?

   a. YEAR(*SAS-date-value*)
   b. MONTH(*SAS-date-value*)
   c. WEEKDAY(*SAS-date-value*)
   d. none of the above

S sas

The MONTH function returns the month number (1-12) extracted from a SAS date value.

8. In the program below, what is the value of **Credit** if **Country** is '*au*'?

```
data work.bonus;
    set orion.sales;
    if Country='US' then Credit=300;
    else if Country='AU' then Credit=500;
    else Credit=0;
run;
```

   a. 300
   b. 500
   c. 0
   d. missing

S sas

The character conditions are case sensitive. The first two IF conditions are false. Therefore, the final ELSE statement assigns **Credit** a value of zero.

9. What is the length of the **Car_Type** column created in this program?

```
data car_type;
    set sashelp.cars;
    if msrp>80000 then car_type="luxury";
    else car_type="regular";
    length car_type $ 8;
run;
```

a. 6

b. 7

c. 8

§sas

When the DATA step is compiled, the first mention of **Car_Type** determines the column name, type, and length. The length is determined by the value in the assignment statement. The value *luxury* has six characters, so the length is 6.

10. Use a DO group in a DATA step when you want to execute multiple statements for a true IF-THEN expression.

a. True

b. False

§sas

To execute more than one statement if a condition is true, you must use IF-THEN/DO groups.

Lesson 5

1. If you run this program, which title or titles appear in the final
   PROC PRINT results?

   (a.) The Top Line

   b. The Top Line
      The Next Line

   c. The Top Line
      The Second Line

   d. The Top Line
      The First Line
      The Next Line

```
title1 'The First Line';
title2 'The Second Line';
proc print data=sales;
run;
title2 'The Next Line';
proc print data=sales;
run;
title 'The Top Line';
proc print data=sales;
run;
```

88

TITLE is the same as TITLE1. The TITLE statement for the last PROC PRINT step cancels out the
higher TITLEn statements.

2. Which statement substitutes the value of the macro variable `Year`
   in the footnote?

   ```
   %let Year=2018;
   ```

   a. `footnote 'year Sales';`

   b. `footnote '&year Sales';`

   c. `footnote "%year Sales";`

   (d.) `footnote "&year Sales";`

90

To reference a macro variable, use the & followed by the name of the macro variable, e.g. &YEAR.
The macro variable must be in double quotes on the FOOTNOTE statement in order for the value to
be substituted. If single quotes are used, the value will not be substituted.

3. Which statement is true based on the given program?

a. The column **BatAvg** will have a permanent label in the **sashelp.baseball** table.

b. The label for **BatAvg** will appear in the PRINT report.

c. The label for **BatAvg** will appear in the MEANS report.

d. The label for **BatAvg** will appear in both reports.

```
data baseball2;
    set sashelp.baseball;
    BatAvg=CrHits/CrAtBat;
    label BatAvg="Batting Average";
run;

proc print data=baseball2;
    var Name Team BatAvg;
run;

proc means data=baseball2;
    var BatAvg;
    class Team;
run;
```

92

§sas

The label will appear in the PROC MEANS report. The label will not appear in the PROC PRINT report because the LABEL option is missing on the PROC PRINT statement. The output table WORK.BASEBALL2 (not the input table SASHELP.BASEBALL) contains a permanent label for BatAvg.

4. Which statement is true regarding a BY statement in a reporting procedure such as PROC PRINT?

a. The BY statement is responsible for sorting the table.

b. Only one column can be specified in the BY statement.

c. The BY statement groups the report by the specified columns.

d. The BY statement must be the first statement after the PROC statement.

94

§sas

The BY statement in a reporting procedure is responsible for grouping the report by the specified columns. One or multiple columns can be on the BY statement. The BY statement can be placed in any order within a PROC step. . The BY statement in PROC SORT is responsible for sorting the table.

---

5. Which statement is false concerning the FREQ procedure?

a. The NOPROCTITLE option can be placed in the PROC FREQ statement to remove the procedure title of **The FREQ Procedure**.

b. The ORDER=FREQ option can be placed in the PROC FREQ statement to display the column values in descending frequency count order.

c. The PLOTS= option can be placed in the TABLES statement after the forward slash to create bar charts based on counts or percentages.

d. The OUT= option can be placed in the TABLES statement after the forward slash to create a table containing counts and percentages.

96

§sas

The NOPROCTITLE option goes in a global ODS statement to remove the procedure title. ods noproctitle;

---

6. Which PROC FREQ step creates the results shown here?

a.
```
proc freq data=sashelp.shoes;
    tables Region nocum;
run;
```

b.
```
proc freq data=sashelp.shoes levels;
    tables Region / nocum;
run;
```

c.
```
proc freq data=sashelp.shoes nlevels;
    tables Region / nocum;
run;
```

d.
```
proc freq data=sashelp.shoes / levels;
    tables Region nocum;
run;
```

Number of Variable Levels	
Variable	Levels
Region	10

Region	Frequency	Percent
Africa	56	14.18
Asia	14	3.54
Canada	37	9.37
Central America/Caribbean	32	8.10
Eastern Europe	31	7.85
Middle East	24	6.08
Pacific	45	11.39
South America	54	13.67
United States	40	10.13
Western Europe	62	15.70

98

§sas

The NLEVELS option in the PROC MEANS statement creates a table displaying the number of levels for all TABLES columns. The NOCUM option in the TABLES statement (goes after the forward slash) suppresses the display of cumulative frequencies and cumulative percentages.

7. Which report is created from the following PROC FREQ step?

```
proc freq data=sashelp.cars;
    where Cylinders in (4,6) and Type in ('Sedan','SUV');
    tables Type*Cylinders / nocol norow crosslist;
run;
```

a.

Frequency Percent	Table of Type by Cylinders		
	Cylinders		
	Type	4	6	Total
	SUV	7	30	37
		2.77	11.86	14.62
	Sedan	96		

b.

Type	Cylinders	Frequency	Percent	Cumulative Frequency	Cumulative Percent
SUV	4	7	2.77	7	2.77
SUV	6	30	11.86	37	14.62
Sedan		96	37.94	132	52.57

c.

Table of Type by Cylinders

Type	Cylinders	Frequency	Percent
SUV	4	7	2.77
	6	30	11.86
	Total	37	14.62

d.

Table of Type by Cylinders

Type	Cylinders	Frequency	Percent	Row Percent	Column Percent
SUV	4	7	2.77	18.92	6.80
	6	30	11.86	81.08	20.00
	Total	37	14.62	100.00	

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§sas

NOCOL removes the Column Percent, NOROW removes the Row Percent, and CROSSLIST displays statistic values in columns instead of stacked in a cell.

a. tables Type*Cylinders / nocol norow;

b. tables Type*Cylinders / nocol norow list;

c. tables Type*Cylinders / nocol norow crosslist;

d. tables Type*Cylinders / crosslsit;

8. Which statement is true concerning the MEANS procedure?

a. The VAR statement is required and identifies the analysis columns.
b. The WAYS statement specifies the number of ways to make unique combinations of class columns.
c. The MAXDEC= option is used in the VAR statement to specify the number of decimal places for the statistics.
d. The _COUNT_ and _FREQ_ columns are automatically included in the output summary table that is produced by the OUT= option of the OUTPUT statement.

102

§sas

The WAYS statement specifies the number of ways to make unique combinations of class variables. The VAR statement is not required. The MAXDEC= option goes on the PROC MEANS statement. _FREQ_ and _TYPE_ are automatically included in the output summary table.

9. The input table must be pre-sorted by the columns listed in the CLASS statement of a PROC MEANS step.

a. True
b. False

```
proc means data=sashelp.heart;
    var Cholesterol;
    class Weight_Status Sex;
run;
```

104

§sas

The input table does not have to be pre-sorted by the columns on the CLASS statement of the PROC MEANS step. If a BY statement was used instead, the columns would need to be sorted.

10. Which statement from PROC MEANS contains valid syntax for creating a summary output table?

a. `out=work.summary mean;`

b. `out work.summary mean(Weight)=TotW;`

c. `output out work.summary Weight=TotW;`

d. `output out=work.summary mean(Weight)=TotW;`

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§sas

The OUTPUT statement writes statistics to an output table. The OUT= option names the output table. statistic(input-variable)=output-variable can be specified on the OUTPUT statement.

Lesson 6

1. Which statement is false concerning the options for the PROC EXPORT statement?

a. The DATA= option identifies the input SAS table.

b. The REPLACE option specifies to overwrite an existing file.

c. The DBMS= option specifies the database identifier for the type of file being created.

d. The OUT= option specifies the path and file name of the external data file being created.

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§sas

The OUTFILE= (not OUT=) option specifies the path and filename of the external data file being created.

2. Which PROC EXPORT step contains valid syntax?

a.
```
proc export outfile="c:\temp\cars.txt" tab
            data=sashelp.cars replace; run;
```

b.
```
proc export data=sashelp.cars dbms=csv
            outfile="c:\temp\cars.csv"; run;
```

c.
```
proc export data=sashelp.class; dbms=csv;
            outfile="c:\temp\cars.csv"; run;
```

d.
```
proc export dbms=tab data=sashelp.cars replace=yes
            outfile="c:\temp\cars.txt"; run;
```

§sas

DATA=, DBMS=, and OUTFILE= are valid PROC EXPORT options. For a, DBMS= is missing in front of TAB. For c, there shouldn't be semi-colons after each option. For d, =YES is not valid after REPLACE.

3. What does the following program create?

```
libname sales xlsx 'c:\mydata\midyear.xlsx';

data sales.q1_2018;
    set sasdata.qtr1_2018;
run;
data sales.q2_2018;
    set sasdata.qtr2_2018;
run;
```

a. two SAS tables: sales.q1_2018 and sales.q2_2018

b. two Excel workbooks: sales.q1_2018 and sales.q2_2018

c. two worksheets in the Excel workbook: midyear: q1_2018 and q2_2018

d. two worksheets in the Excel workbook: sales: q1_2018 and q2_2018

§sas

The LIBNAME specifies the Excel workbook MIDYEAR. The DATA statements reference to create the worksheets Q1_2018 and Q2_2019 within the workbook MIDYEAR. The library reference of SALES is what links the LIBNAME and DATA statements.

4. Which statement disassociates the `sales` libref?

```
libname sales xlsx 'c:\mydata\midyear.xlsx';
```

a. `libname sales end;`
b. `libname sales clear;`
c. `libname sales close;`
d. `libname sales disassociate;`

§sas

The CLEAR option on the LIBNAME statement disassociates one or more currently assigned librefs.

5. What type of output file does this program create?

```
libname mylib xlsx "s:/workshop/output/test.xlsx";

data class_list;
    set sashelp.class;
run;
```

a. SAS table
b. delimited file
c. Microsoft Excel XLS file
d. Microsoft Excel XLSX file

§sas

The DATA statement references CLASS_LIST. A libref is not specified so WORK is assumed. WORK.CLASS_LIST is a temporary SAS table.

6. Which of these programs creates a Microsoft Excel file?

a.
```
ods excel file="s:/workshop/output/class.xlsx";
proc print data=sashelp.class;
run;
ods excel close;
```

b.
```
libname mylib xlsx "s:/workshop/output/class.xlsx";
data mylib.class_list;
    set sashelp.class;
run;
```

c. both

d. neither

119

§sas

Both, ODS EXCEL and the LIBNAME with XLSX engine create Excel workbooks.

7. Which of the following is not a valid ODS statement?

a. `ods csvall file='c:\temp\myfile.csv';`

b. `ods pdf file='c:\temp\myfile.pdf';`

c. `ods powerpoint file='c:\temp\myfile.ppt';`

d. `ods word file='c:\temp\myfile.doc';`

121

§sas

WORD is not a valid destination for the ODS statement. The RTF destination will create a file that can be opened by word processors.

```
ods rtf file='c:\temp\myfile.rtf';
```

8. What statement needs to be added to the end of this program?

```
ods pdf file='c:\temp\myfile.pdf';

proc print data=sashelp.class;
run;
```

a. `ods clear;`
b. `ods close;`
c. `ods pdf clear;`
d. `ods pdf close;`

§sas

The CLOSE argument closes the destination and the file that is associated with it.

9. Which statement is false concerning the options for the ODS statement?

a. The STYLE= option names the desired font.
b. The FILE= option specifies the output file to create.
c. The STRARTPAGE= controls the behavior of page breaks.
d. The PDFTOC= option controls the level of the expansion of the table of contents in PDF documents.

§sas

The STYLE= option names the style to use in the output file. The style controls visual aspects such as colors and fonts.

10. Which statement contains valid syntax for specifying a worksheet name?

a. `ods excel sheet_name='Males';`

b. `ods excel (sheet_name='Males');`

c. `ods excel option(sheet_name='Males');`

d. `ods excel options(sheet_name='Males');`

127

SHEET_NAME= is a sub-option that goes in a set of parentheses for the OPTIONS option.

Lesson 7

1. What is the correct order of the following four clauses?

a.
```
from ...
  select ...
    where ...
      order by ...
```

b.
```
order by ...
  from ...
    select ...
      where ...
```

c.
```
select ...
  where ...
    order by ...
      from ...
```

d.
```
select ...
  from ...
    where ...
      order by ...
```

130

First is SELECT, second is FROM, third is WHERE, and fourth is ORDER BY.

2. Which of the following is false regarding the SQL procedure?

a. Column names are separated with commas.

b. The procedure ends with a QUIT statement.

c. Formats can be specified in the FROM clause.

d. The SELECT and FROM clauses are required in the SELECT statement.

SAS

Formats are specified in the SELECT clause after the column name.

3. Which syntax is valid for creating a computed column in the SELECT clause?

a. `Ratio = Height/Weight`

b. `Ratio as Height/Weight`

c. `Height/Weight = Ratio`

d. `Height/Weight as Ratio`

SAS

Computed columns are created by specifying the expression, the keyword AS, and the column name, in that order.

4. The SELECT statement creates a report. Which clause can be added before the SELECT clause to create a table?

a. `create work.new =`

b. `create work.new table`

c. `create table work.new as`

d. `create table=work.new as`

136

To create a table, add the CREATE TABLE NEW-TABLE-NAME AS clause before the SELECT clause.

5. Which SELECT statement produces the given output?

Name	Height
Thomas	57.5
Joyce	51.3

a.
```
select Name Height
    from sashelp.class
    where age=12
    order by Height;
```

b.
```
select Name, Height
    from sashelp.class
    where age=12
    order by Height desc;
```

c.
```
select Name Height
    from sashelp.class
    where age=12
    order by desc Height;
```

d.
```
select Name, Height
    from sashelp.class
    where age=12
    order by desc Height;
```

138

On the SELECT clause, column names are seperated with commas. On the ORDER BY clause, DESC goes after the column name. ASC is the default sort order.

6. Which SQL statement can delete tables?

a. DROP
b. VOID
c. DELETE
d. SELECT

§sas

The DROP TABLE statement deletes tables.

7. If an inner join is performed on the following tables based on the **ID** and **IDNO** columns, how many rows will be in the PROC SQL report?

Name	ID
Jack	111
Mary	333
Jane	555

IDNO	Salary
111	75000
222	83000
333	82000

a. one
b. two
c. three
d. four

§sas

An inner join gives matches only. Jack (111) and Mary (222) are the matches in this example.

8. Which statement has the correct syntax for performing an inner join?

a.
```
select ID, Name, Salary
    from one join two
    on ID=IDNO;
```

b.
```
select ID, Name, Salary
    from one join two
    where ID=IDNO;
```

c.
```
select ID, Name, Salary
    from one inner join two
    on ID=IDNO;
```

d.
```
select ID, Name, Salary
    from one inner join two
    where ID=IDNO;
```

SAS

To perform an inner join, specify INNER JOIN between two table names and specify the matching condition in an ON clause (not WHERE clause).

```
data one;
    input Name $ ID;
    datalines;
Jack 111
Mary 333
Jane 555
;

data two;
    input IDNO Salary;
  datalines;
111 75000
222 83000
333 82000
;

proc sql;
    select ID, Name, Salary
    from one inner join two
    on ID=IDNO;
quit;
```

9. Which ON clause has valid qualifying syntax?

a.
```
from empsau inner join phonec
    on e.empid=p.empid;
```

b.
```
from empsau inner join phonec
    on left.empid=right.empid;
```

c.
```
from empsau inner join phonec
    on first.empid=second.empid;
```

d.
```
from empsau inner join phonec
    on empsau.empid=phonec.empid;
```

§sas

To qualify a column, put the table name and a period before the column name. Qualifying is needed when a column is in multiple tables. EMPSAU.EMPID refers to the EMPID column in the EMPSAU table.

```
data empsau;
    input First $ Gender $ EmpID;
    datalines;
Togar   M   121150
Kylie   F   121151
Birin   M   121152
;

data phonec;
    input EmpID Phone $15.;
    datalines;
121150 +61(2)5555-1795
121152 +61(2)5555-1667
121154 +61(2)5555-1348
;

proc sql;
    select First,Gender,empsau.EmpID,Phone
    from empsau inner join phonec
    on empsau.empid=phonec.empid;
quit;
```

10. Which FROM clause is properly creating aliases?

a. `from empsau=e inner join phonec=p`

b. `from empsau(e) inner join phonec(p)`

c. `from empsau as e inner join phonec as p`

d. `from empsau of e inner join phonec of p`

148

SAS

To create an alias on the FROM clause, put the word AS and the alias after the table name. The word AS is optional. The alias can be used when qualifying a column.

```
proc sql;
    select First,Gender,empsau.EmpID,Phone
    from empsau as e inner join as p phonec
    on empsau.empid=phonec.empid;
quit;
```