```
/******SAS code solution for Q1******/
data WORK.Hist_sales_impute;
  set WORK.Hist_sales;
  array x[*] _numeric_;
  do j=1 to dim(x);
     if x[j]=. then x[j]=0;
  end;
  drop j;
run;


/******SAS code solution for Q2******/
 data Overdue_new;
   set Overdue;
   avg_overdue=mean(of month1-month12);
   tot_overdue=sum(of month1-month12);
  array o[12] $ overdue_1-overdue_12;
  array m[12] month1-month12;
  do j=1 to 12;
     if m[j]=1 then o[j]='Yes';
          else o[j]='No';
      end;
    keep id overdue_1-overdue_12;
 run;


/******SAS code solution for Q3******/
data phone;
  infile datalines DSD;
  length tel_number $20.;
  input id  tel_number $;
datalines;
1,(988)463-4490
2,(241) 343-2233
3,456-5034
4,(123)456-7890
5,(271)SH4-1234
6,(592)2578362
;
run;

data phone_verify;
 set phone;
 num_nospace=trim(left(compress(tel_number)));
 condition1=(substr(num_nospace,1,1)='(');
```

```
 condition2=(substr(num_nospace,5,1)=')');
 try=substr(num_nospace,2,3)+0;
 condition3=(_error_=0);
 try=substr(num_nospace,6,3)+0;
 condition4=(_error_=0);
 condition5=(substr(num_nospace,9,1)='-');
 try=substr(num_nospace,10)+0;
 condition6=(_error_=0);
 condition7=(length(num_nospace)=13);
 cond=sum(of condition1-condition7);
 if cond=7 then valid='YES';
 else valid='NO';
 keep id tel_number valid;
run;


/******SAS code solution for Q4******/
data exam_grade;
  infile 'E:\onlinetraining\session56_interaction\grade_exam.csv' DSD firstobs=2
  obs=max;
  array ans[*] $ answer1-answer12;
  array mark[*] mark1-mark12;
  array correct[*] correct1-correct12;
  array missing[*] missing1-missing12;
  array standard{12} $ _temporary_ ('A' 'B' 'D' 'A' 'C' 'A' 'B' 'B' 'D' 'A' 'B' 'B');
  input student_id $ ans[*] $;

  do question=1 to 12;
    if ans[question]='' then ans[question]='9';

    if ans[question]=standard{question} then do;
            mark[question]=1; correct[question]=1; missing[question]=0;
           end;
           else if ans[question]='9' then do;
             mark[question]=0.5; correct[question]=0; missing[question]=1;
           end;
           else do;
              mark[question]=0; correct[question]=0; missing[question]=0;
           end;
  end;
  corrate=round(100*mean(of correct1-correct12),0.1);
  cornum=sum(of correct1-correct12);
  misrate=round(100*mean(of missing1-missing12),0.1);
  misnum=sum(of missing1-missing12);
  errorrate=round(100-corrate-misrate,0.1);
  errnum=12-cornum-misnum;
```

```
 grade=round(100*sum(of mark1-mark12)/12,1);
 keep student_id grade corrate cornum misrate misnum errorrate errnum;
RUN;


/******SAS code solution for Q5******/
Data transaction_lag;
  set transaction;
  array a[3] time_dif_1-time_dif_3;
  array b[3] amount_1-amount_3;
  if first='N' then do;
    time_dif_1=round(dif1(tran_time)/3600,0.01);
          time_dif_2=round(dif2(tran_time)/3600,0.01);
          time_dif_3=round(dif3(tran_time)/3600,0.01);
          amount_1=lag1(amount);
          amount_2=lag2(amount);
          amount_3=lag3(amount);
         end;
         last_tran_time=tran_time;
         if last='Y' then output;
         format amount_1-amount_3 dollar10. last_tran_time datetime16.;
         keep customer_id  last_tran_time
       time_dif_1-time_dif_3 amount_1-amount_3;
 run;

 /******SAS code solution for Q6 (a)******/
data Dailyprice_sum;
   set Dailyprice;
   meanprice50=mean(of pc_1-pc_50);
   maxprice50=max(of pc_1-pc_50);
   minprice50=min(of pc_1-pc_50);
   stdprice50=std(of pc_1-pc_50);
   rangeprice50=range(of pc_1-pc_50);
   keep EXEC SYMBOL meanprice50 maxprice50 minprice50 stdprice50 rangeprice50;
run;


 /******SAS code solution for Q6 (b)******/
 data Dailyprice_change;
   set Dailyprice;
         array p[31] pc_1-pc_31;
   array v[31] vo_1-vo_31;
   array chp[30] changerate_price_1-changerate_price_30;
   array chv[30] changerate_volume_1-changerate_volume_30;
   do j=1 to 30;
        if p[j+1]>0 then chp[j]=round(100*(p[j]-p[j+1])/p[j+1],0.1);
```

```
        if v[j+1]>0 then chv[j]=round(100*(v[j]-v[j+1])/v[j+1],0.1);
  end;
 keep EXEC SYMBOL changerate_price_1-changerate_price_30
          changerate_volume_1-changerate_volume_30;
run;


 /******SAS code solution for Q7******/
data WORK.Ticketinfo_new;
     set WORK.Ticketinfo;
     tempticket=compress(ticket);
     destination=substr(tempticket,4,3);
     time=substr(tempticket,8,8);
     y=substr(time,1,4)+0;
     m=substr(time,5,2)+0;
     d=substr(time,7,2)+0;
     start_time=mdy(m,d,y);
     age=INTCK('year', birth_date,today());
     format start_time date9.;
     keep name ticket destination start_time birth_date age;
run;

/******SAS code solution for Q8******/
 data cusomer_1;
    set WORK.Customers;
    if Lan_spoken="E";
 run;

 data cusomer_sample;
    set cusomer_1;
    if ranuni(_n_)<0.1976;
 run;
```