```
1          OPTIONS NONOTES NOSTIMER NOSOURCE NOSYNTAXCHECK;
72
73         data birdlung;
74         infile '/home/u63745078/Assignment 9/birdlung.data.txt';
75         input Lung_Cancer Sex Socioeconomic_Status Birdkeeping Age Years_smoked Cigarettes_per_day;
76

NOTE: The infile '/home/u63745078/Assignment 9/birdlung.data.txt' is:
      Filename=/home/u63745078/Assignment 9/birdlung.data.txt,
      Owner Name=u63745078,Group Name=oda,
      Access Permission=-rw-r--r--,
      Last Modified=19 March 2024 20:05:00,
      File Size (bytes)=3526

NOTE: 147 records were read from the infile '/home/u63745078/Assignment 9/birdlung.data.txt'.
      The minimum record length was 21.
      The maximum record length was 22.
NOTE: The data set WORK.BIRDLUNG has 147 observations and 7 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              756.21k
      OS Memory           26792.00k
      Timestamp           22/03/2024 06:20:16 PM
      Step Count                        42  Switch Count  2
      Page Faults                       0
      Page Reclaims                     156
      Page Swaps                        0
      Voluntary Context Switches        17
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           272


77         proc means data=birdlung n mean std min max;
78         title '9a';
79             var Age Years_smoked Cigarettes_per_day;
80
81

NOTE: Font specification "body_font" failed. Using default font family instead.
NOTE: Font specification "heading_font" failed. Using default font family instead.
NOTE: Font specification "heading_font" failed. Using default font family instead.
NOTE: Font specification "body_font" failed. Using default font family instead.
NOTE: Font specification "body_font" failed. Using default font family instead.
NOTE: There were 147 observations read from the data set WORK.BIRDLUNG.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.03 seconds
      user cpu time       0.04 seconds
      system cpu time     0.00 seconds
      memory              8805.37k
      OS Memory           34492.00k
      Timestamp           22/03/2024 06:20:16 PM
      Step Count                        43  Switch Count  2
      Page Faults                       0
      Page Reclaims                     1998
      Page Swaps                        0
      Voluntary Context Switches        28
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           8


82         proc freq data=birdlung;
83         title '9a';
84             tables Lung_Cancer Sex Socioeconomic_Status Birdkeeping;
85
86

NOTE: There were 147 observations read from the data set WORK.BIRDLUNG.
NOTE: PROCEDURE FREQ used (Total process time):
      real time           0.03 seconds
      user cpu time       0.03 seconds
      system cpu time     0.00 seconds
      memory              1078.34k
      OS Memory           29868.00k
      Timestamp           22/03/2024 06:20:16 PM
      Step Count                        44  Switch Count  3
      Page Faults                       0
      Page Reclaims                     173
      Page Swaps                        0
      Voluntary Context Switches        23
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264
```

```
87         proc freq data=birdlung order=freq;
88         title '9a';
89             tables Cigarettes_per_day / nocum nopercent;
90
```

```
NOTE: There were 147 observations read from the data set WORK.BIRDLUNG.
NOTE: PROCEDURE FREQ used (Total process time):
      real time           0.01 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              876.21k
      OS Memory           29868.00k
      Timestamp           22/03/2024 06:20:16 PM
      Step Count                        45  Switch Count  3
      Page Faults                       0
      Page Reclaims                     150
      Page Swaps                        0
      Voluntary Context Switches        25
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           280
```

```
91         proc logistic data=birdlung;
92
93              title '11: Logistic regression, with lung cancer as the response variable';
94              model Lung_Cancer(event='1') = Sex Socioeconomic_Status Birdkeeping Age Years_smoked Cigarettes_per_day;
95
```

```
NOTE: PROC LOGISTIC is modeling the probability that Lung_Cancer=1.
NOTE: Convergence criterion (GCONV=1E-8) satisfied.
NOTE: There were 147 observations read from the data set WORK.BIRDLUNG.
NOTE: PROCEDURE LOGISTIC used (Total process time):
      real time           0.06 seconds
      user cpu time       0.06 seconds
      system cpu time     0.00 seconds
      memory              2422.18k
      OS Memory           30904.00k
      Timestamp           22/03/2024 06:20:16 PM
      Step Count                        46  Switch Count  1
      Page Faults                       0
      Page Reclaims                     254
      Page Swaps                        0
      Voluntary Context Switches        8
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           64
```

```
96         proc iml;
NOTE: IML Ready
97         title 'the estimated odds of cancer for a participant of high socioeconomic status are ____ times as great, compared to
97       ! a participant of low socioeconomic status.';
98
98       !  odds_ratio = exp(0.1054);
99
99       !  print odds_ratio;
100
NOTE: Exiting IML.
NOTE: PROCEDURE IML used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              484.75k
      OS Memory           29604.00k
      Timestamp           22/03/2024 06:20:16 PM
      Step Count                        47  Switch Count  1
      Page Faults                       0
      Page Reclaims                     63
      Page Swaps                        0
      Voluntary Context Switches        8
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           0
```

```
101        proc iml;
NOTE: IML Ready
102        title 'confidence interval for last number';
103
103      !  A = 0.1054 - 1.96*0.4113;
103      !                            B = -0.1054 + 1.96*0.4113;
104
104      !  lower = exp(A);
105
105      !  higher = exp(B);
106
106      !  print lower higher;
107
108
```

```
NOTE: Exiting IML.
NOTE: PROCEDURE IML used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              505.15k
      OS Memory           29604.00k
      Timestamp           22/03/2024 06:20:16 PM
      Step Count                        48  Switch Count  1
      Page Faults                       0
      Page Reclaims                     57
      Page Swaps                        0
      Voluntary Context Switches        10
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           8


109        proc iml;
NOTE: IML Ready
110             title '11fFor a non-smoking, bird-keeping woman of average age and low socioeconomic status, what is the estimated
110      ! probability of lung cancer? ';
111             b0 = -1.9375;
112             b1 = 0.5613;
113             b2 = 0;
114             b3 = 1.3626;
115             b4 = -0.0398;
116             b5 = 0;
117             b6 = 0;
118             mean_age = 56.9659864;
119
120             lcombo = b0 + b1*1 + b2*0 + b3*1 + b4*mean_age + b5*0 + b6*0;
121             probCancer = exp(lcombo) / (1 + exp(lcombo));
122             print "11f: Estimated probability of lung cancer for the specified individual is " probCancer;
123
NOTE: Exiting IML.
NOTE: PROCEDURE IML used (Total process time):
      real time           0.00 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              534.15k
      OS Memory           29604.00k
      Timestamp           22/03/2024 06:20:16 PM
      Step Count                        49  Switch Count  1
      Page Faults                       0
      Page Reclaims                     55
      Page Swaps                        0
      Voluntary Context Switches        10
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           8


124        proc iml;
NOTE: IML Ready
125             title '11g:For a non-smoking, non-bird-keeping woman of average age and low socioeconomic status, what is the
125      ! estimated probability of lung cancer?';
126             b0 = -1.9375;
127             b1 = 0.5613;
128             b2 = 0;
129             b3 = 0;
130             b4 = -0.0398;
131             b5 = 0;
132             b6 = 0;
133             mean_age = 56.9659864;
134
135             lcombo = b0 + b1*1 + b2*0 + b3*0 + b4*mean_age + b5*0 + b6*0;
136             probCancer = exp(lcombo) / (1 + exp(lcombo));
137             print "11g: Estimated probability of lung cancer for a non-bird-keeping woman is " probCancer;
138
NOTE: Exiting IML.
NOTE: PROCEDURE IML used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              528.40k
      OS Memory           29604.00k
      Timestamp           22/03/2024 06:20:16 PM
      Step Count                        50  Switch Count  1
      Page Faults                       0
      Page Reclaims                     55
      Page Swaps                        0
      Voluntary Context Switches        10
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           0


139        proc logistic data=birdlung;
140             model Lung_Cancer(event='1') = Sex Socioeconomic_Status Birdkeeping Age Years_smoked Cigarettes_per_day;
```

```
141             title 'Full Model Including Birdkeeping';
142
```

```
NOTE: PROC LOGISTIC is modeling the probability that Lung_Cancer=1.
NOTE: Convergence criterion (GCONV=1E-8) satisfied.
NOTE: There were 147 observations read from the data set WORK.BIRDLUNG.
NOTE: PROCEDURE LOGISTIC used (Total process time):
      real time           0.06 seconds
      user cpu time       0.07 seconds
      system cpu time     0.00 seconds
      memory              2219.59k
      OS Memory           30904.00k
      Timestamp           22/03/2024 06:20:16 PM
      Step Count                        51  Switch Count  1
      Page Faults                       0
      Page Reclaims                     201
      Page Swaps                        0
      Voluntary Context Switches        9
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           72
```

```
143        proc logistic data=birdlung;
144             model Lung_Cancer(event='1') = Sex Socioeconomic_Status Age Years_smoked Cigarettes_per_day;
145             title 'Reduced Model Excluding Birdkeeping';
146
```

```
NOTE: PROC LOGISTIC is modeling the probability that Lung_Cancer=1.
NOTE: Convergence criterion (GCONV=1E-8) satisfied.
NOTE: There were 147 observations read from the data set WORK.BIRDLUNG.
NOTE: PROCEDURE LOGISTIC used (Total process time):
      real time           0.06 seconds
      user cpu time       0.06 seconds
      system cpu time     0.01 seconds
      memory              2157.25k
      OS Memory           31160.00k
      Timestamp           22/03/2024 06:20:16 PM
      Step Count                        52  Switch Count  1
      Page Faults                       0
      Page Reclaims                     211
      Page Swaps                        0
      Voluntary Context Switches        10
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           72
```

```
147        proc iml;
NOTE: IML Ready
148        Full=154.198;
149        Red = 165.868;
150        G = Full - Red;
151        print g;
152
```

```
NOTE: Exiting IML.
NOTE: PROCEDURE IML used (Total process time):
      real time           0.00 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              473.37k
      OS Memory           29860.00k
      Timestamp           22/03/2024 06:20:17 PM
      Step Count                        53  Switch Count  0
      Page Faults                       0
      Page Reclaims                     94
      Page Swaps                        0
      Voluntary Context Switches        0
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           0
```

```
153        proc iml;
NOTE: IML Ready
154             G = 11.67;
154      !               /* The chi-square statistic */
155             df = 1;
155      !             /* Degrees of freedom */
156             p_value = 1 - probchi(G, df);
156      !                                  /* Calculate the p-value */
157             print p_value;
158        run;
NOTE: Module MAIN is undefined in IML; cannot be RUN.
159
160
161
162        OPTIONS NONOTES NOSTIMER NOSOURCE NOSYNTAXCHECK;
174
```