

1. (a) 0.6774515  
 (b) 0.4132649  
 (c)  $-0.11816$   
 (d) A one-centigrade increase in temperature corresponds to a predicted 0.4132649-unit increase in PM2.5 concentration.  
 (e)  $[0.3235709, 0.5029589]$   
 (f) 9.386933  
 (g) Yes, it is dangerous because of **extrapolation**.  
 (h) Since observations were collected at the same location over time, there is likely serial correlation among the datapoints.  
 (i) There isn't one specific correct answer. A correct answer should:
  - state either “yes” or “no”
  - make some reference to the linearity of the QQ-plots
  
2. (a) Answers may vary.  
 (b) 0.1, using the Multiplication Rule.  
 (c) 0.85, using the Addition Rule.  
 (d)  $0.\overline{18}$ , using either the definition of conditional probability or Bayes' Rule.
  
3. (a) Observational study.  
 (b) Cross-sectional study.  
 (c) Stratified sampling.  
 (d)  $\mu_1 =$  average PM2.5 concentration in City A;  $\mu_2 =$  average PM2.5 concentration in City B.  
 (e)  $\begin{bmatrix} H_0 : \mu_1 = \mu_2 \\ H_A : \mu_1 \neq \mu_2 \end{bmatrix} = \begin{bmatrix} H_0 : \mu_2 - \mu_1 = 0 \\ H_A : \mu_2 - \mu_1 \neq 0 \end{bmatrix}$   
 (f)  $-1.448572$   
 (g)  $TS \stackrel{H_0}{\sim} t_{60}$   
 (h) 2.00  
 (i) Fail to reject the null.
  
4. (a)  $3 \times (12)^5 \times 3$   
 (b) Yes  
 (c)  $1/3$   
 (d)  $1/9$