The University of Texas at Austin
Homework assignment 6
Predictive Analytics

February 25, 2026

Instructions: Provide your complete solution to the following problems. Final answers only, without appropriate justification, will receive zero points even if correct.

Problem 6.1. ($4 \times 3 = 12$ points) Solve Problem **2.4.2** from the textbook (pp.52-53).

Solution.

- $n = 500, p = 3$, regression, inference
- $n = 20, p = 13$, classification, prediction
- $n = 52, p = 3$, regression, prediction

Problem 6.2. ($4 + 4 = 8$ points) Solve Problem **2.4.4 (a) and (b)** from the textbook (p.53).

Solution. Solutions will vary!

Problem 6.3. ($3 + 2 + 2 + 5 = 12$ points) Solve Problem **2.4.7** from the textbook (p.54).

Solution.

- $$1 : \sqrt{3^2} = 3$$
  $$2 : \sqrt{2^2} = 2$$
  $$3 : \sqrt{1^2 + 3^2} = \sqrt{10} = 3.162278$$
  $$4 : \sqrt{1^2 + 2^2} = \sqrt{5} = 2.236068$$
  $$5 : \sqrt{1^2 + 1^2} = \sqrt{2} = 1.414214$$
  $$6 : \sqrt{1^2 + 1^2 + 1^2} = \sqrt{3} = 1.732051$$
- *Green*, because observation #5 is the closest
- *Red*, because observations #2 and #6 join observation #5 in the neighborhood
- *Small* is better because its more local.

Problem 6.4. ($4 \times 2 = 8$ points) Solve Problem **3.7.4** from the textbook (p.122).

Solution.

- The RSS for the cubic should be lower for the training set.
- The RSS for the cubic will potentially be higher for the test set due to overfitting.
- Again, the RSS for the cubic should be lower for the training set.
- We cannot conclude anything here since the nature of nonlinearity is not provided.

Problem 6.5. (10 points) Solve Problem **4.8.1** from the textbook (p.189).

Solution.

$$
\begin{aligned}
\frac{p(X)}{1-p(X)} = e^{\beta_0+\beta_1 x} \quad &\Leftrightarrow \quad p(X) = (1-p(X))e^{\beta_0+\beta_1 x} \\
&\Leftrightarrow \quad p(X) = e^{\beta_0+\beta_1 x} - p(X)e^{\beta_0+\beta_1 x} \\
&\Leftrightarrow \quad p(X)\left(1+e^{\beta_0+\beta_1 x}\right) = e^{\beta_0+\beta_1 x} \quad \Leftrightarrow \quad p(X) = \frac{e^{\beta_0+\beta_1 x}}{1+e^{\beta_0+\beta_1 x}}
\end{aligned}
$$