THE UNIVERSITY OF BRITISH COLUMBIA
DEPARTMENT OF STATISTICS

STAT 447B Methods for Statistical Learning (2014/15 Term 1)
Quiz 1 Solution

1. No, as the model is non-linear in β_2.

2. When x increases by 1 unit, the estimated change in mean/average/expected Y is -0.260560.

3. (a) $\hat{\beta}_2 = -0.883739$. The interpretation is that, at $x = \kappa_1 = 5.5$, the estimated slope of the fitted regression line relating the expected value of Y to x decreases by about 0.88 (or, it contributes to a change of slope of -0.88 for $x \geq 5.5$).

   (b) Since 5.75 is after κ_1 but before κ_2, the slope is $\hat{\beta}_1 + \hat{\beta}_2 = 0.004917 - 0.883739 = -0.878822$.

   (c) The prediction is $\hat{\beta}_0 + \hat{\beta}_1 \times 5.75 + \hat{\beta}_2 \times (5.75 - 5.5) = -0.073428 + 0.004917 \times 5.75 - 0.883739 \times 0.25 = -0.26609$.

   (d) It is inadequate as the two parameters relating to the changes in slope are highly significant.

   (e) The linear-splines model is more flexible (the attribute) such that the bias (statistical property) of prediction seems to have decreased overall.