HOMEWORK 2 : Nonparametric statistics & Function estimation

2014/11/10

1. Let $F(x)$ be a cumulative distribution function. We observe the following data from F.

$$-15.4 \quad -8.8 \quad 8.2 \quad 3.4 \quad -7.1 \quad 4.5 \quad -12.7 \quad 5.2 \quad -10.6 \quad -11.2$$

(1) Calculate and draw the empirical distribution function of this sample.
(2) Find 95% pointwise confidence intervals for $F(x)$ at $x=-10$ and $x=5$. Which one is broader?
(3) Calculate and draw a 95% confidence band for F.

2. The following data is a sample from a continuous distribution. We want to test if the true distribution is $U(0,2)$.

$$0.42 \quad 0.84 \quad 0.12 \quad 1.95 \quad 1.91 \quad 1.75 \quad 1.79 \quad 1.99 \quad 1.08 \quad 0.12$$

(1) Test it at the significance level 0.1. (Divide (0,2) into 3 sub-intervals with equal lengths)
(2) Calculate the Komogorov-Smirnov test statistic $\sup_x|\widehat{F_n}(x)-F_0(x)|$ where $\widehat{F_n}$ is the empirical distribution function and F_0 is the cdf of $U(0,2)$.

3. One fitted the linear regression model and calculated the standardized residuals as follows.

0.486	-0.541	0.550	0.068	0.521	1.399	-1.297	-0.937	-1.563	-1.493
-0.161	-0.541	-0.893	0.935	-1.988	0.014	-0.032	-1.228	0.349	0.893
1.494	-0.889	0.894	0.945	0.367	0.648	0.425	2.960	0.600	-0.609

Determine if the normality assumption on the error term is acceptable or not. (Divide the whole real line into 5 sub-intervals that insist equal probabilities & significance level 0.1)