STAT 445 Lab 7
ASSIGNMENT # 7
Due: Lab 8 (at the end)

Question 1 (Kernel density estimation)

Use the dataset 'assign4.dat' (variable '*change*') to explore how

(a) different kernels affect the resulting density estimates.

(b) different bandwidths affect the resulting density estimates.

Provide several examples with clear corresponding plots and briefly describe your findings.

Question 2 (Simulation to investigate asymptotic approximations)

Suppose $X_1, \ldots, X_n$ are independent and identically distributed with probability density function $f(.)$. Let the mean, median, and variance of this distribution be μ, M, and σ^2 respectively. Recall that for any distribution, for large enough values of n, we have the following asymptotic approximations:

$$\bar{X} \simeq N\left(\mu,\ \frac{\sigma^2}{n}\right),$$

$$m \simeq N\left(M,\ \frac{1}{4nf^2(m)}\right),$$

where $\bar{X}$ denotes the sample mean and m denotes the sample median.

Now, suppose you want to check whether this is true for exponential random variables, with a mean of θ.

(a) Find expressions for M and σ^2 for this probability density function.

(b) Carry out a simulation to investigate the adequacy of the two above approximations for $n = 10$ (use $\theta = 1$). Provide clear plots to illustrate your results and describe your conclusions.