Please answer each question with a written response (no code required). Feel free to use whatever software you want for your write-up. However, you should convert it to a `pdf` file for your submission upload.

Question 1: Software-defined Networks

Assume that a software-defined network (SDN) has been installed on top of the six routers (R1 through R6) in the graph below. This network is managed by an ISP that is in charge of routing traffic across a wide area. The External links connecting to R1 and R6 indicate entry and exit points for the network. Assume all links have the same throughput.
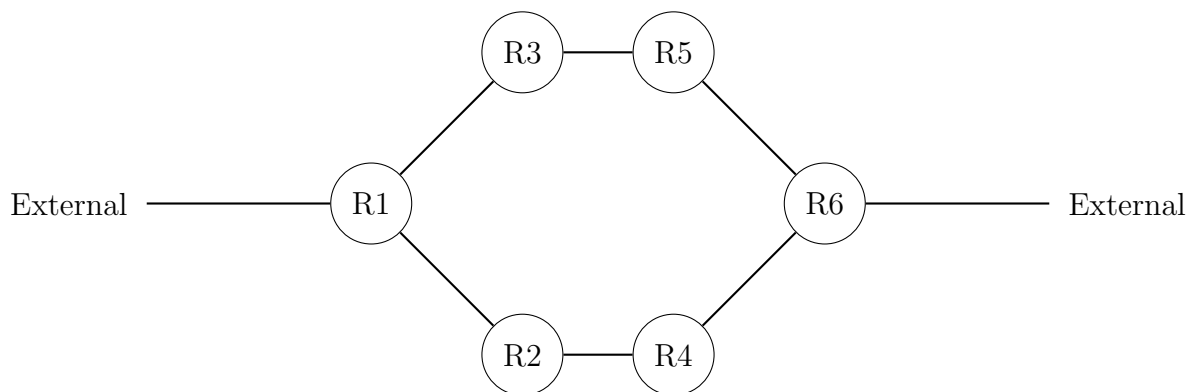
The ISP has decided to use the power of SDNs to implement some cutting-edge features. Please indicate what **rules** and **actions** would need to be added to which **router** to enable each of the following features (do not worry how these features would interact):

(a) Drop all HTTP traffic (destination port 80). The ISP requires all such traffic to use HTTPS.

(b) Give preferential treatment (faster routing) to all data from the `44.44\16` subnet. All premium users of the ISP have an IP address in that block.

Question 2: Parity Bits

For this problem, assume a simple one-dimensional parity bit scheme as presented in the book. We are interested in determining the likelihood of detecting bit flip errors in a block of transmitted data using a parity bit. This likelihood can be determined by two factors: 1) the number of data bits per single parity bit and 2) the bit error rate (i.e., percentage chance of a bit flip). Assuming at least one bit flip, compute the likelihood of successful bit error detection using a parity bit in the following scenarios:

(a) 7 data bits per parity bit; bit error rate of 1%.

(b) 15 data bits per parity bit; bit error rate of 0.5%.