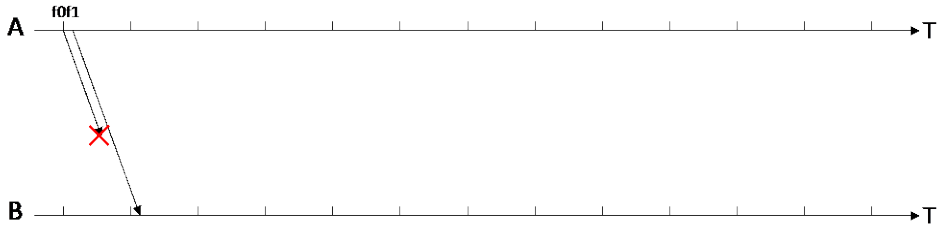
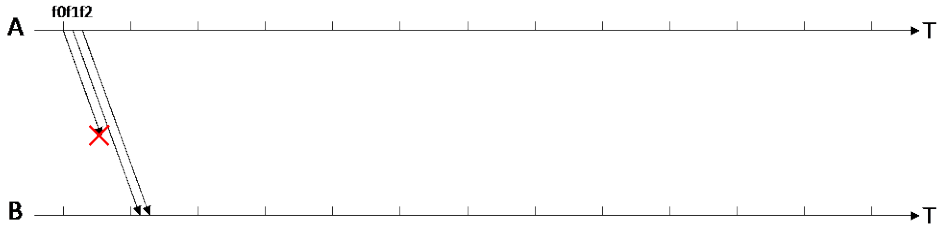
Cpr E 489 Spring 2023
Homework #3
Due Date: 3/7/2023 (Tue) by 11:59 PM
Type or scan your answers and submit on Canvas

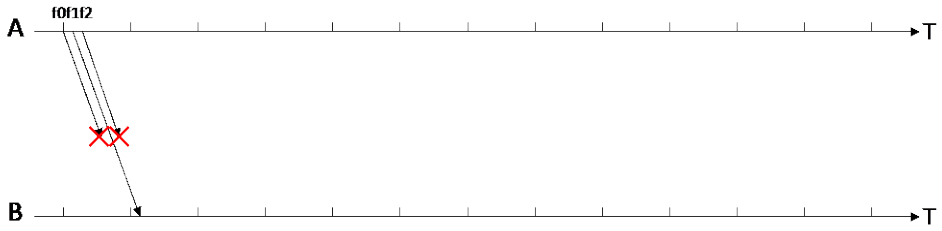
1. (80 points) ARQ Protocols
   a. (50 points) Suppose A tries to send **four frames (f0, f1, f2, f3)** to B (i.e., no more frames to send after f3). Suppose that f0 is lost on the first attempt, while all other transmissions (including re-transmitted data frames and ACK/NAK frames) succeed. Suppose one-way propagation delay is 1 time unit, and timeout for each frame is 8 time units. Complete the frame exchange sequence until all four frames are delivered successfully with each one of the following ARQ protocols.
      i. Go-Back-N ARQ protocol with N = 2.
      ii. Selective Repeat ARQ protocol with Ws = Wr = 2.



      iii. Go-Back-N ARQ protocol with N = 3.
      iv. Selective Repeat ARQ protocol with Ws = Wr = 3.



   b. (30 points) Suppose A tries to send **five frames (f0, f1, f2, f3, f4)** to B (i.e., no more frames to send after f4). Suppose that f0 and f2 are lost on the first attempt, while all other transmissions (including re-transmitted data frames and ACK/NAK frames) succeed. Suppose one-way propagation delay is 1 time unit, and timeout for each frame is 8 time units. Complete the frame exchange sequence until all five frames are delivered successfully with each one of the following ARQ protocols.
      i. Go-Back-N ARQ protocol with N = 3.
      ii. Selective Repeat ARQ protocol with Ws = Wr = 3.



2. (20 points) As shown in the figure, a CSMA/CD based LAN has a **tree topology** and it consists of 7 segments connected by 3 repeaters. The maximum length of each segment is 120 meters and the processing delay at each repeater is 1 μs. It transmits at 110 Mbps and signal propagates at $2*10^8$ m/s. What is the **minimum frame size** required for this CSMA/CD based LAN to operate properly? Justify your answer.