

**Homework Set # 3**

Due: Friday, 9 November 07

1. Find the order of departures for (a) GPS and (b) WFQ in the following scenario. Two equal weight queues are served by a unit rate server. At time 0, a packet of length 3 units arrives to queue 1. At time 1, a packet of length 1 unit arrives to queue 2. At time 2, a packet of length 1 unit arrives to queue 1.
2. A 2 Mbps link is shared by three traffic classes 1, 2, 3 with weights 2, 1, 1 respectively. Class 1 traffic is voice with a fixed packet length of 200 bytes. Classes 2 and 3 each have a maximum packet length of 1500 bytes.
  - (a) Find a lower service curve for class 1.
  - (b) Find the smallest possible upper service curve for class 1.
3. A token bucket regulator has buffer size  $B$ , bucket size  $b$  and token rate  $\rho$ . Show that an arrival process with envelope

$$E(t) = \begin{cases} B + b + \rho t & t \geq 0 \\ 0 & t < 0 \end{cases}$$

does not suffer data loss in the regulator.