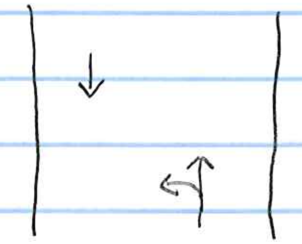
(6) Let's consider another case:

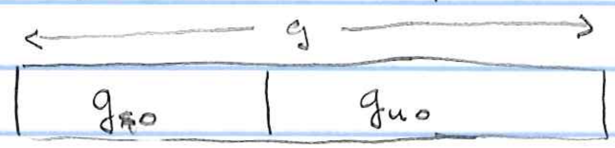
LT permitted

shared LT/TH lane



What is the capacity of the NB lane?

1. Consider these time periods for the SB (opposing) approach.



2. There are two possibilities for the NB (subject) lane:
   - The TH vehicles will flow freely as they would in an exclusive TH lane
   - the TH vehicles are blocked by a LT vehicle waiting to turn.

So we have to know how long after the green begins that the TH vehicles can flow freely, which is really the time until the first LT vehicle arrives in the server. This time is dependent on both the LT vol and the proportion of LT vehicles of the total flow (LT + TH) in the shared lane: V_{LT} and $\dfrac{V_{LT}}{V_{LT}+V_{TH}}$

We define g_f as the time after start of green that the first subject LT vehicle arrives.

3. Further, we need to know if this first subject LT vehicle arrives before or after the opposing queue clears. Let's look at both cases:

Case 1: First subject LT vehicle arrives before opposing queue clears.

↓ opp	g_{so}		g_{uo}
↰ sub	g_f	?	g_u
		$g_{so} - g_f$	

Case 2: First subject LT vehicle arrives after opposing queue clears.

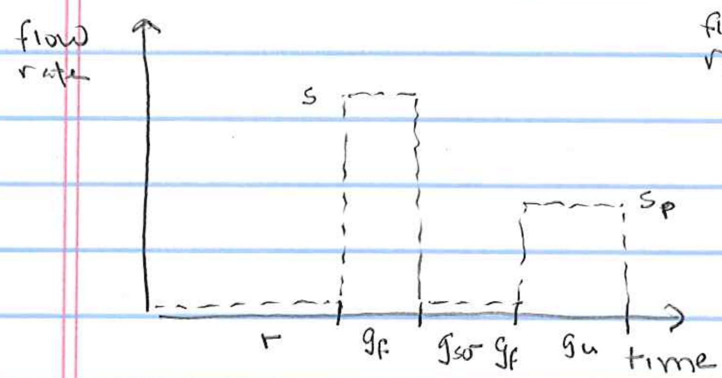
↓ opp	g_{so}	g_{uo}	
↰ sub	g_f		g_u

Case 1:	g_f	subject lane TH vehicles depart freely from the intx
	$g_{so} - g_f$	first subject LT vehicle arrives and blocks lane as opposing queue is still clearing
	g_u	LT (and TH) vehicles depart, with LT veh. limited by available gaps in opp. stream.
Case 2:	g_f	subj. lane TH vehicles depart freely from the intx
	g_u	LT (and TH) vehicles depart, with LT vehicles limited by available

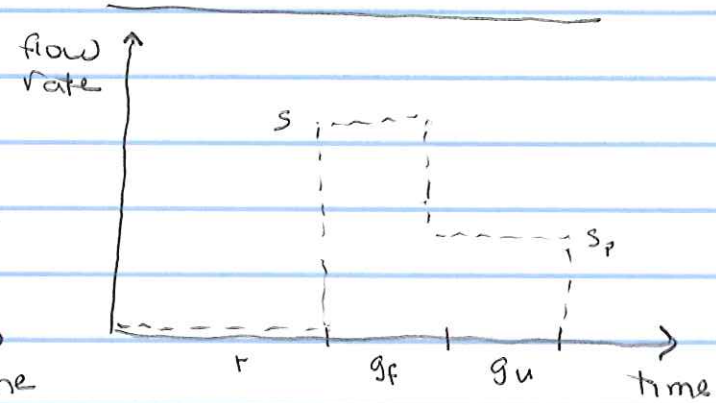
EXERCISE FOR THEM

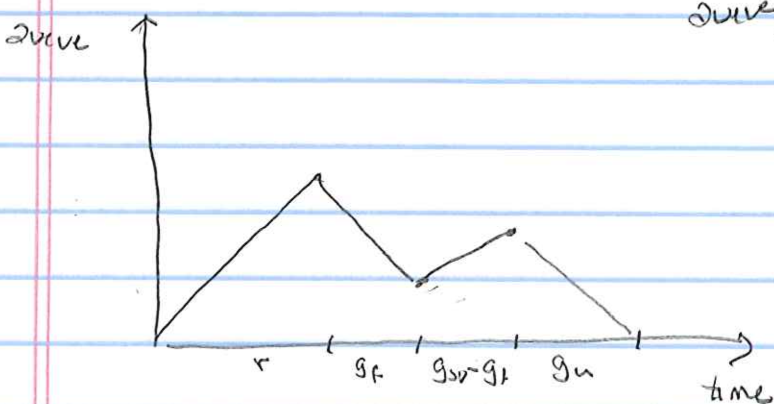
4. Queuing diagrams

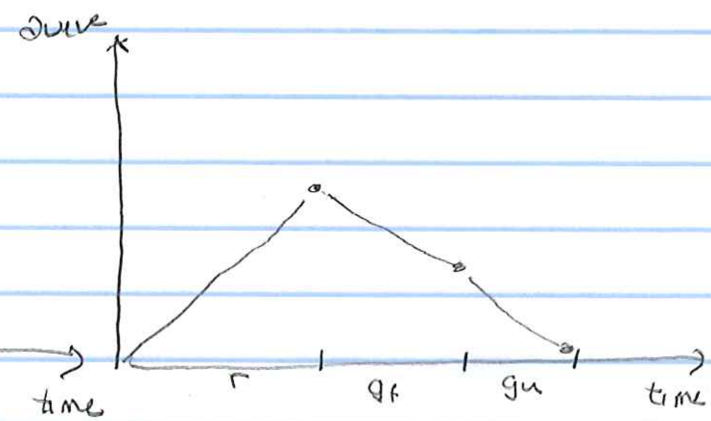
Case 1



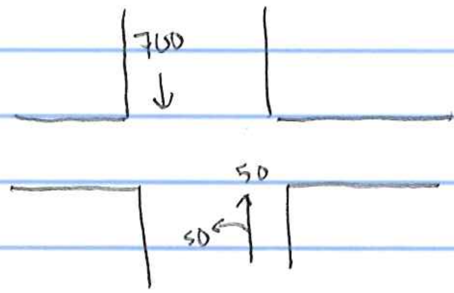
Case 2







5 Example calculation



$C = 60$ sec

$g/C = 0.5$

$s = 1900$

a. Compute g_f

$$g_f = g e^{-(.86 LTC^{.629})} \quad , \; g_f \le g$$

g = eff green time

LTC = LT per cycle $= \dfrac{V_{LT}}{(3600/C)}$

$$LTC = \frac{V_{LT}}{(3600/C)} = \frac{50}{(3600/60)} = 0.833 \ \frac{\text{LT veh}}{\text{cycle}}$$

$$g_f = g e^{-.860\,LTC^{.629}}$$

$$= (30) e^{-.860(.833)^{.629}}$$

$$= (30)\, e^{-.860(.8914)}$$

$$= 30(.4646)$$

$$= 14.0\text{ s}$$

b. compute $g_{q0} = \dfrac{V_0 r}{S - V_0} = \dfrac{(700)(30)}{1900 - 700}$

$$= 17.5\text{ s}$$

c. $g_u = g - g_{so}$ if $g_{so} \ge g_f$

$= g - g_f$ if $g_{so} < g_f$

d. $g_{so} - g_f = 17.5 - 14.0 = 3.0\,s$

$\longleftarrow g = 30 \longrightarrow$

opp ↓	$g_{so} = 17.5$		$g_{uo} = 12.5$
sub. 4φ'	$g_f = 14.0$	3.5	$g_u = 12.5$