

Answer the test questions on the yellow paper provided. Express yourself clearly, legibly, and concisely!! Put your name on the first yellow sheet and your initials on each succeeding sheet you use.

$$\mu = 101.5, \sigma = 12.2$$

1. (15 points) **Hybrid buses at GLPTC.** At their April 2007 Board Meeting, the board members were told that the two hybrid buses #1501 and #1502 were averaging 5.59 and 5.46 mpg, respectively, since they were put into service in March. New diesel bus #1503 was averaging 3.92 mpg. The data for the fuel efficiency of Buses #1501-#1503 on Monday 16 April 2007 are given in the table below.

Bus #	MPG	Bus #	MPG	Bus #	MPG
1501	4.48	1502	6.26	1503	4.11

All the new buses have been assigned to a variety of routes, including Route 4B Purdue West/Klondike (the most rural route) and the Trolley Route 23 (which runs through downtown Lafayette to the campus, experiencing frequent stops and numerous signalized intersections). If one hybrid bus was assigned to Route 4B and the other hybrid was assigned to Route 23 on 16 April, which hybrid bus was probably assigned to the Trolley route?

Explain your answer.

A route with more frequent stops (for passengers or signals) has a greater percentage of its VMT devoted to acceleration and braking. Therefore, the diesel engine is in use for a smaller fraction of the less distance covered. Because Bus #1502 had a higher MPG value than Bus #1501 on 16 April 2007, Bus #1502 was probably the bus providing service on the Trolley Route 23.

2. (10 points) **Subsidy Allocation.** In HW8, a \$32 million state transit subsidy fund was allocated to ATOs using an STSF formula that was developed during two in-class workshops. The state legislature just voted to increase the subsidy fund to \$39 million. How much subsidy would GLPTC get under the STSF formula if this increase becomes law? Show your calculations.

The STSF formula simply allocates a sum of money among the participating ATOs. If GLPTC received \$1,759,596 when the total was \$32 million, then GLPTC's share of \$39 million would be $\$1,759,596 \times (39/32) = \$2,144,508$.

3. (20 points) **Field trip to GLPTC.** Answer any four of the five questions below. If you answer more than four, only the first four answers you give will be graded.
- A. Why is the camera that looks forward through the windshield in the newer systems a color (vs. black-and-white) camera? Give two reasons.
- A color camera will be able to better (1) determine the phase of traffic signals and (2) the color of other vehicles.

B. How can the bus driver make sure an incident recorded by the camera systems is not overwritten?

He/She can press a button that marks the video recording starting 5 minutes ago, preventing the recording from being overwritten

C. If an ACCESS passenger is given a scheduled arrival time of 1:00PM, what is the earliest and latest time the ACCESS vehicle must arrive?

Earliest = 12:45PM, Latest = 1:15PM.

D. What is one reason AVL data are stored and studied by GLPTC Operations staff?

To check schedule adherence on routes. If buses are frequently late, routes or schedules might be revised. If buses are frequently early, drivers will have to be reminded or disciplined.

E. In the new paint booth, why are paper bags put over the fire sprinkler heads?

To protect the sprinkler heads from being clogged by paint particles.

4. (10 points) **Fare-cheating Bus-hoppers.** A handout on this subject was emailed to you on 17 April 2007. What would you advise NYC Transit to do about the problem?

The article says nothing about cameras on buses, but if some buses are so equipped, put them on routes that have this problem. In the absence of cameras, have plain-clothes police ride the buses most plagued by “bushoppers”.

5. **Automated People Mover for Purdue Campus.**

A. (10 points) Cite three characteristics that define an APM.

(1) Fixed guideway, (2) exclusive right-of-way, (3) centralized control (no driver), (4) demand-responsive or continuous service.

B. (10 points) Describe a route and right-of-way design that guarantees that switching will not be necessary and that APM vehicles will never collide.

(1) A separate loop for each vehicle or vehicle direction.

(2) A shuttle (back and forth) on its own right-of-way.

6. **Amtrak and High-Speed Rail.**

A. (10 points) What is the main argument used by those who want to end federal operating subsidies to Amtrak? One or two sentences.

It does not make sense to continue funding a mode that is used by so few and covers so little of its operating costs.

B. (10 points) What is the main argument used by those who want to increase federal operating subsidies to Amtrak? One or two sentences.

A nationwide passenger rail system can only work if it has adequate coverage and sufficient frequency of service. Do not give up on a transportation mode that is an alternative to other modes.

C. (10 points) What is the main argument used by those who want to invest in high-speed rail? One or two sentences.

High-speed rail travel (esp. if new technology can be used) will attract lots of riders from intercity buses, automobiles, and airlines, thereby giving travelers a wider choice of transportation modes.

7. **Jeffrey Sriver and CTA.**

A. (10 points) Why does CTA discourage cash fares by giving fare discounts for non-cash fare media? One sentence.

Cash is the most expensive fare medium to collect and process.

B. (10 points) Why not use driverless technology for the new Airport Express service from Block 37 in Downtown Chicago? One or two sentences.

Driverless technology would involve exclusive right-of-way and centralized control, both of which would be extremely expensive to provide.