

$$\mu = 74.1, \sigma = 12.5$$

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

1. (15 points) **Transit history.** What transit "emissions" were worse than the exhaust from an old diesel bus? Please choose your words carefully.

In the 1800s, when animals were used to pull transit vehicles, those animals would "emit" solid and liquid waste on the road surface. (1:46)

2. **Bus Rapid Transit at Purdue?**

- A. (10 points) What would distinguish a BRT service on campus from the existing campus routes? Name two characteristics.

Exclusive ROWs, signal priority, accelerated boarding from special station platforms, off-board fare collection. (3:11)

- B. (10 points) Of the BRT characteristics you mentioned in Part A, which one do you think will be the most difficult to achieve along the route proposed for the Purdue campus. Justify your answer.

Exclusive ROW will not be possible on some sections of the proposed route, unless an expanded cross-section is provided or other vehicles are no longer permitted on those sections. It may not be practical to provide the space or the equipment to permit off-board fare collection. (2:32)

3. (15 points) **Rider Paradox.** Explain why transit systems are considering fare increases and service cuts, even as ridership is growing significantly.

See the handout emailed on 6 Feb 2009. As ridership grows, more capacity may need to be provided, which involves added capital and operating costs. At the same time, sources of subsidies (local and state sales taxes) are shrinking in the bad economic climate. (2:03)

4. **PFI as a Performance Measure.** Critique the Productivity Frequency Index used by the Milwaukee County Transit System.

- A. (10 points) Why do you think the MCTS likes the PFI?

The PFI gives the MCTS an objective, easy-to-compute way to combine ridership numbers with service

numbers (RVH and headway) to identify routes that may be overserved or underserved. (2:18)

- B. (10 points) Now that you have used the PFI in HW4, what do you consider to be a negative aspect or weakness of the PFI?

Negative: I found it very tedious to go through the route schedules to compute RVH. I hope there is an easier way to get RVH if PFI is adopted.

Weakness: Does the $10 < PFI < 12$ range work for all transit systems? Can the PFI values be used to compare routes in a system? PFI does not include cost aspects. (4:44)

5. **Adopted Transit Operations.** Based on the handouts distributed by the ATO representatives, answer two questions (5 points each) of the following three. Your answer must be an ATO other than your own.

- A. Which system has a fare-free zone? *Portland TriMet, Tahoe's Heavenly Ski Shuttles*
- B. Which city had an **elevated** electric rail line in the 1880s? *Louisville KY*
- C. Which system provides service across state borders? *TARC (if I read the map correctly), Tahoe's BlueGo, Washington Metro, and Omaha's MAT (3:27)*

6. **Designing a Route.** A planned downtown circulator **loop** would be 2.27 miles long. Its expected operating speed will be 9.3 mph, not including layover time.

- A. (5 points) Calculate the Round Trip (one loop) Time.

Equation in class was for out-and-back route. This is a loop. $RTT = (2.27 \text{ mi} / 9.3 \text{ mph}) * (60 \text{ min/hr}) = 14.65 \text{ min} = 14:39$ (2:43)

- B. (5 points) To guarantee that headway does not exceed 5 minutes along the route, how many vehicles are needed on the loop?

Without layover time, $NV = RTT/h = 14.65/5 = 2.93 \text{ vehs} \rightarrow 3 \text{ vehs.}$ (1:23)

- C. (10 points) If drivers are entitled to 5 minutes of layover time each hour, how would you ensure that this requirement is met without disrupting service?

$NV \rightarrow 4?$ How avoid gap(s) in service? Another solution? \rightarrow future HW problem?

(5:23) (27:22 total)