

Sheet No(3) Spot speed and delay studies



Prob1: Table shows the data collected on a rural highway in Virginia during a speed study. **Develop** the frequency histogram and the frequency distribution of the data and **determine:** The arithmetic mean speed - The standard deviation - The median speed - The pace - The 85th-percentile speed.

| Car No. | speed | Car No. | speed | Car No. | speed | Car No. | Speed (mi/h) |
|---------|-------|---------|-------|---------|-------|---------|--------------|
| 1 | 35.1 | 23 | 46.1 | 45 | 47.8 | 67 | 56 |
| 2 | 44 | 24 | 54.2 | 46 | 47.1 | 68 | 49.1 |
| 3 | 45.8 | 25 | 52.3 | 47 | 34.8 | 69 | 49.2 |
| 4 | 44.3 | 26 | 57.3 | 48 | 52.4 | 70 | 56.4 |
| 5 | 36.3 | 27 | 46.8 | 49 | 49.1 | 71 | 48.5 |
| 6 | 54 | 28 | 57.8 | 50 | 37.1 | 72 | 45.4 |
| 7 | 42.1 | 29 | 36.8 | 51 | 65.0 | 73 | 48.6 |
| 8 | 50.1 | 30 | 55.8 | 52 | 49.5 | 74 | 52 |
| 9 | 51.8 | 31 | 43.3 | 53 | 52.2 | 75 | 49.8 |
| 10 | 50.8 | 32 | 55.3 | 54 | 48.4 | 76 | 63.4 |
| 11 | 38.3 | 33 | 39.0 | 55 | 42.8 | 77 | 60.1 |
| 12 | 44.6 | 34 | 53.7 | 56 | 49.5 | 78 | 48.8 |
| 13 | 45.2 | 35 | 40.8 | 57 | 48.6 | 79 | 52.1 |
| 14 | 41.1 | 36 | 54.5 | 58 | 41.2 | 80 | 48.7 |
| 15 | 55.1 | 37 | 51.6 | 59 | 48.0 | 81 | 61.8 |
| 16 | 50.2 | 38 | 51.7 | 60 | 58.0 | 82 | 56.6 |
| 17 | 54.3 | 39 | 50.3 | 61 | 49.0 | 83 | 48.2 |
| 18 | 45.4 | 40 | 59.8 | 62 | 41.8 | 84 | 62.1 |
| 19 | 55.2 | 41 | 40.3 | 63 | 48.3 | 85 | 53.3 |
| 20 | 45.7 | 42 | 55.1 | 64 | 45.9 | 86 | 53.4 |
| 21 | 54.1 | 43 | 45.0 | 65 | 44.7 | | |
| 22 | 54 | 44 | 48.3 | 66 | 49.5 | | |

Prob2: Consider the following spot speed data, collected from a freeway site operating under free-flow conditions:

| Group speed (Mi/h) | Number of vehicles Observed N |
|--------------------|----------------------------------|
| 15-20 | 0 |
| 20-25 | 3 |
| 25-30 | 6 |
| 30-35 | 18 |
| 35-40 | 45 |
| 40-45 | 48 |
| 45-50 | 18 |
| 50-55 | 12 |
| 55-60 | 4 |
| 60-65 | 3 |
| 65-70 | 0 |

- Plot the **frequency** and the **cumulative** curves.
- Find and identify on curves: **the median speed, pace, and percent vehicles in pace**, **mean and standard deviation** of speed distribution.

Prob3:- The data in Table were obtained in a **travel time** study on a section of highway using the **moving-vehicle technique**. Determine the travel time and volume in each direction at this section of the highway.

| Run number Eastward | Travel Time (min) | Opposite Veh. N | Vehicles Overtook | Vehicles Overtaken |
|------------------------|----------------------|--------------------|----------------------|-----------------------|
| 1 | 2.75 | 80 | 1 | 1 |
| 2 | 2.55 | 75 | 2 | 1 |
| 3 | 2.85 | 83 | 0 | 3 |
| 4 | 3 | 78 | 0 | 1 |
| 5 | 3.05 | 81 | 1 | 1 |
| 6 | 2.7 | 79 | 3 | 2 |
| 7 | 2.82 | 82 | 1 | 1 |
| 8 | 3.08 | 78 | 0 | 2 |

| Run number Westward | Travel Time (min) | Opposite Veh. N | Vehicles Overtook | Vehicles Overtaken |
|------------------------|----------------------|--------------------|----------------------|-----------------------|
| 1 | 2.95 | 78 | 2 | 0 |
| 2 | 3.15 | 83 | 1 | 1 |
| 3 | 3.2 | 89 | 1 | 1 |
| 4 | 2.83 | 86 | 1 | 0 |
| 5 | 3.3 | 80 | 2 | 1 |
| 6 | 3 | 79 | 1 | 2 |
| 7 | 3.22 | 82 | 2 | 1 |
| 8 | 2.91 | 81 | 0 | 1 |

Obtain the **volume** and the **average travel time** in each direction.