

Auto Safety

You work for an automobile insurance company. Your boss has assigned you the task of reviewing recent auto safety records and thinking about how that information may be relevant to your company. You found these data on the web.

HIGHWAY LOSS DATA INSTITUTE (www.hwysafety.org) AUTOMOBILE INSURANCE INJURY LOSSES (2000-01)

| SMALL CARS | | MID-SIZE CARS | | LARGE CARS | |
|---------------|--------|---------------|--------|----------------|--------|
| Model | Rating | Model | Rating | Model | Rating |
| A4 Quattro | 63 | Saab 9-3 | 58 | Buick LeSabre | 39 |
| Audi A4 | 67 | Buick Century | 63 | Bonneville | 53 |
| VW Beetle | 69 | Toyota Avalon | 66 | Grand Marquis | 53 |
| Volvo S40 | 82 | Volvo S70 | 72 | Buick Regal | 57 |
| VW Golf | 91 | Lexus ES 300 | 75 | Olds Intrigue | 58 |
| Impreza | 98 | Saturn LS | 76 | Crown Victoria | 63 |
| Subaru G20 | 104 | Acura | 78 | Concorde | 66 |
| Saturn SL | 104 | VW Passat | 80 | Chrysler LHS | 66 |
| Honda Civic | 105 | Infiniti I30 | 82 | Chrysler 300M | 70 |
| VW Jetta | 107 | Maxima | 94 | Chevy Impala | 73 |
| Chevy Prizm | 118 | Chevy Malibu | 97 | Chevy Lumina | 73 |
| Ford Focus | 120 | Olds Alero | 97 | Grand Prix | 74 |
| Acura Integra | 133 | Cirrus | 98 | Mercury Sable | 80 |
| Nissan Sentra | 134 | Honda Accord | 102 | Monte Carlo | 85 |
| Eclipse | 136 | Toyota Camry | 102 | Ford Taurus | 88 |
| Chevy Metro | 138 | Grand Am | 105 | Dodge Intrepid | 92 |
| Ford Escort | 141 | Mystique | 108 | | |
| Civic Coupe | 143 | Diamante | 109 | | |
| Proton | 144 | Millenia | 114 | | |
| Corolla | 147 | Ford Contour | 118 | | |
| Dodge Neon | 167 | Dodge Stratus | 122 | | |
| Accent | 181 | Breeze | 128 | | |
| Elantra | 190 | Cavalier | 134 | | |
| Kia Sephia | 221 | Mazda 626 | 135 | | |
| Mirage | 246 | Sunfire | 140 | | |
| Esteem | 247 | Nissan Altima | 144 | | |
| | | Galant | 164 | | |
| | | Sonata | 169 | | |

Insurance injury loss results are stated in relative terms. 100 represents average result for all cars.
Lower numbers are better. For example, a rating of 122 means 22% worse than average.

Write a report to your boss, including:

- appropriate comparative plots and summary statistics;
- descriptions of the injury ratings for each group of cars;
- a comparison of injury ratings for the three sizes of cars;
- your recommendation to your boss about your company's insurance policies.

| | Components | Comments |
|--------------|--|----------|
| Think | Demonstrates clear understanding of statistical concepts and techniques in comparing the three distributions | |
| Show | <ul style="list-style-type: none"> ○ uses parallel boxplots ○ has consistent scale (any kind of graphs) ○ graphs are correct and clearly labeled ○ 5 # summaries and IQR's are correct | |
| Tell | <p>Compares centers:</p> <ul style="list-style-type: none"> ○ numerically (probably medians) ○ compares groups to each other ○ compares each group to average (100) ○ discusses all three groups <p>Compares variability:</p> <ul style="list-style-type: none"> ○ notes differences in IQR's ○ correctly interprets those differences ○ notes outliers ○ notes that groups overlap (ex: ??% of small cars safer than median of midsize) <p>States conclusion:</p> <ul style="list-style-type: none"> ○ in context (W's, insurance co. memo) ○ interprets the ratings properly ○ makes a recommendation ○ avoids speculation (drivers, accidents, etc) | |

4 Components are scored as Essentially correct, Partially correct, or Incorrect

1: Graph Boxplots, on the same scale, clearly labeled with correct numerical summaries.

E – All four requirements. P – Only 2 or 3. I – Fewer than 2

2: Compare the centers Correctly compares all three groups to each other and to the overall average (100), with proper use of numerical summaries (medians).

E – All four requirements. P – Only 2 or 3. I – Fewer than 2

3: Compare the spreads Compares variability within groups (IQRs), noting consistent safety in large cars and greater variability elsewhere. Notes outliers. Discusses overlap between groups, probably using medians and quartiles.

E – All four requirements. P – Only 2 or 3. I – Fewer than 2

4: General conclusion Clearly written, in the proper context, the general conclusion correctly interprets the ratings and recommends some course of action (perhaps lower premiums for large cars).

E – All four requirements. P – Only 2 or 3. I – Fewer than 2

Scoring:

- E's count 1 point, P's are 1/2
- AP Score = sum of components; rounding based on quality of "Partial" responses.
- Grade: A = 4, B = 3, etc., with +/- based on rounding (ex: 3.5 rounded to 3 is a B+)

Name _____ AP Score _____ Grade _____