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Q1. (a) This is an experiment because there is human intervention in it, and researcher undertake some experiment to get the results, and it involves random selection on the steak and grill brands.

The population inference is applicable since the steaks and grill brands are randomly selected,

The causal inference is not applicable with no causal relationships associated.

Q2. (a)

(b) There are all unimodal. The one of Greystone is right-skewed, that of Broil queen is symmetric, that of BBBQ is left-skewed. There is no outlier for the three distributions.

(c) The distribution of Greystone has a mode at 10.2~10.4 (smallest among the three), and spread through the range of 9.4~11.6 (largest among the three)

The one of Broil Queen has a mode at 10.4~10.6 (medium), and spread through 9.8~11.2 (smallest)

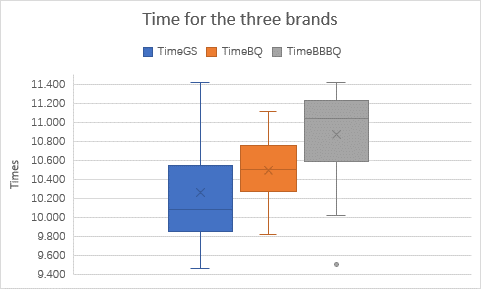
The one of BBBQ has a mode at 11.0~11.2 (largest), and spread through 9.4~11.6 (largest)

(d) The distribution of Greystone has mean > median

The one of Broil Queen has mean = median

The one of BBBQ has mean < median

Q3. (a)



(b) The boxplot for GS is up-skewed (right-skewed), that for BQ is down-skewed (left-skewed), that for BBBQ is down-skewed (left-skewed).

One outlier for boxplot of time for BBBQ

(c) For GS, center is the smallest among the three, spread is the largest among the three.

For BQ, center is the medium, spread is the smallest.

For BBBQ, center is the highest, spread is the medium.

(d) Modes analysis is consistent with Q2(c).

Ranges analysis is not consistent with Q2(c).

In boxplot, spread is the medium instead of largest for distribution of BBBQ.

Q4. (a)

|  |  |  |  |
| --- | --- | --- | --- |
| **BRAND** | **Greystone** | **Broil Queen** | **BBBQ** |
| MEAN | 10.263 | 10.494 | 10.868 |
| STD. DEV. | 0.564 | 0.337 | 0.519 |
| MODE(S) | 10.08 | 10.432 | 10.912 |
| RANGE | 1.960 | 1.288 | 1.920 |

For means, BBBQ > BQ > GS. For STD. DEV., GS > BBBQ > BQ

For modes, BBBQ > BQ > GS. For ranges, GS > BBBQ > BQ

Modes analysis is consistent with Q2(c).

Ranges analysis is not consistent with Q2(c)

In Q2(c), for ranges, BBBQ = GS > BQ

(b)

|  |  |  |  |
| --- | --- | --- | --- |
| **BRAND** | **Greystone** | **Broil Queen** | **BBBQ** |
| MIN | 9.464 | 9.824 | 9.504 |
| Q1 | 9.888 | 10.272 | 10.72 |
| MEDIAN | 10.084 | 10.504 | 11.04 |
| Q3 | 10.272 | 10.728 | 11.2 |
| MAX | 11.424 | 11.112 | 11.424 |
| IQR | 0.384 | 0.456 | 0.48 |

The 5-number summary is consistent with conclusions about the shape in Q3, but not Q2.

For GS, median=10.084 < mean=10.263, so right-skewed.

For BQ, median=10.504 > mean=10.494. so left-skewed not symmetric

For BBBQ, median=11.04 > mean=10.868, so left-skewed.

(c)

|  |  |  |  |
| --- | --- | --- | --- |
| **MASS** | **MEAN** | **STD. DEV.** | **MEAN CHANGE** |
| 2.000 | 9.59733 | 0.19732 | NaN |
| 2.125 | 9.90933 | 0.18475 | 0.31200 |
| 2.250 | 10.19733 | 0.37908 | 0.28800 |
| 2.375 | 10.19733 | 0.33307 | 0.00000 |
| 2.500 | 10.30933 | 0.44119 | 0.11200 |
| 2.625 | 10.58400 | 0.64374 | 0.27467 |
| 2.750 | 10.44400 | 0.57236 | -0.14000 |
| 2.875 | 10.50933 | 0.37184 | 0.06533 |
| 3.000 | 10.46400 | 0.50798 | -0.04533 |
| 3.125 | 10.70933 | 0.56914 | 0.24533 |
| 3.250 | 10.80000 | 0.49960 | 0.09067 |
| 3.375 | 10.59200 | 0.32000 | -0.20800 |
| 3.500 | 10.59867 | 0.32021 | 0.00667 |
| 3.625 | 10.92267 | 0.18475 | 0.32400 |
| 3.750 | 11.14933 | 0.03233 | 0.22667 |
| 3.875 | 11.13733 | 0.32517 | -0.01200 |
| 4.000 | 11.08267 | 0.56372 | -0.05467 |

Highest mean change is 0.32400 as mass=3.625.

Lowest mean change is -0.20800 as mass=3.375.

Average mean change is 0.09283.

Q5. In terms of variation, the lower variation the best, BQ is the best brand with an STDEV of 0.337.

In terms of fastest time, GS is the best brand with a MEAN of 10.263 and a smallest range (spread).

The trend in Q4(c) does not impact the choice of best brand because it analyzes the mean and STDEV of the three brands in total, the result is the performance of the three brand together. We cannot identify which one is the best brand according to this.