**Null hypothesis (H0):** The mean departure delays are the same for 2 airlines *Atlantic Southeast Airlines* and *Hawaiian Airlines Inc.*

**Alternative hypothesis:** The mean departure delays are different for 2 airlines *Atlantic Southeast Airlines* and *Hawaiian Airlines Inc.* (Mean departure delay for *Atlantic Southeast Airlines* is much higher than *Hawaiian Airlines Inc.*)

**Set α**

Significance level at 5% here.

# Exploring the sample data

Query Used:

*select f.uniquecarrier,f.year,f.month, totalflights,*

*d.number\_of\_delays,*

*(d.number\_of\_delays \* 100)/totalflights as delayPercentage*

*from (select distinct(uniquecarrier), year,month,*

*count(arrdelay) as totalflights*

*from ontime*

*group by uniquecarrier, year,month) f*

*inner join*

*(select distinct(uniquecarrier), year,month,*

*count(arrdelay) as number\_of\_delays*

*from ontime*

*where arrdelay > 15*

*group by uniquecarrier, year,month) d*

*on f.uniquecarrier = d.uniquecarrier and f.year = d.year and f.month=d.month*

*inner join carrriers c on f.uniquecarrier = c.Code*

*and f.uniquecarrier in ('EV','HA')*

*group by f.uniquecarrier, f.year,f.month, totalflights, d.number\_of\_delays*

*order by totalflights desc, delayPercentage asc;*

Data after getting from query -

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Airline | Year | Months | Total Flight | Delay Flight | Delay Percentage | Mean | Standard Deviation |
| EV | 2003 | 1 | 23602 | 4581 | 19 | 24.91667 | 7.740055 |
| EV | 2003 | 4 | 23511 | 4433 | 18 |
| EV | 2003 | 3 | 23097 | 5678 | 24 |
| EV | 2003 | 5 | 22941 | 5172 | 22 |
| EV | 2003 | 10 | 22805 | 3392 | 14 |
| EV | 2003 | 12 | 22484 | 3926 | 17 |
| EV | 2003 | 6 | 21921 | 5375 | 24 |
| EV | 2003 | 11 | 21843 | 3042 | 13 |
| EV | 2003 | 7 | 21576 | 6696 | 31 |
| EV | 2003 | 9 | 21412 | 3370 | 15 |
| EV | 2003 | 8 | 21159 | 5993 | 28 |
| EV | 2003 | 2 | 20409 | 5182 | 25 |
| EV | 2004 | 10 | 23898 | 6033 | 25 |
| EV | 2004 | 8 | 23852 | 4029 | 16 |
| EV | 2004 | 12 | 23648 | 6112 | 25 |
| EV | 2004 | 7 | 23492 | 5350 | 22 |
| EV | 2004 | 11 | 23358 | 6616 | 28 |
| EV | 2004 | 5 | 22392 | 3977 | 17 |
| EV | 2004 | 9 | 22382 | 3728 | 16 |
| EV | 2004 | 1 | 22218 | 3418 | 15 |
| EV | 2004 | 4 | 22146 | 2697 | 12 |
| EV | 2004 | 3 | 21836 | 2279 | 10 |
| EV | 2004 | 6 | 21676 | 6638 | 30 |
| EV | 2004 | 2 | 19946 | 4642 | 23 |
| EV | 2005 | 10 | 25422 | 5011 | 19 |
| EV | 2005 | 5 | 25405 | 4495 | 17 |
| EV | 2005 | 6 | 25204 | 6820 | 27 |
| EV | 2005 | 7 | 24877 | 8134 | 32 |
| EV | 2005 | 8 | 24854 | 8443 | 33 |
| EV | 2005 | 3 | 24761 | 5894 | 23 |
| EV | 2005 | 9 | 24725 | 4167 | 16 |
| EV | 2005 | 11 | 24336 | 5091 | 20 |
| EV | 2005 | 4 | 24332 | 4559 | 18 |
| EV | 2005 | 1 | 22766 | 5654 | 24 |
| EV | 2005 | 12 | 22297 | 6927 | 31 |
| EV | 2005 | 2 | 21187 | 6364 | 30 |
| EV | 2006 | 3 | 23644 | 5569 | 23 |
| EV | 2006 | 5 | 23563 | 5531 | 23 |
| EV | 2006 | 7 | 23555 | 9264 | 39 |
| EV | 2006 | 8 | 23315 | 8997 | 38 |
| EV | 2006 | 10 | 22400 | 9352 | 41 |
| EV | 2006 | 4 | 22268 | 5168 | 23 |
| EV | 2006 | 6 | 21914 | 7255 | 33 |
| EV | 2006 | 1 | 21527 | 5108 | 23 |
| EV | 2006 | 11 | 21514 | 6768 | 31 |
| EV | 2006 | 9 | 21257 | 8796 | 41 |
| EV | 2006 | 2 | 20513 | 5179 | 25 |
| EV | 2006 | 12 | 20369 | 5416 | 26 |
| EV | 2007 | 8 | 24856 | 10424 | 41 |
| EV | 2007 | 10 | 24465 | 8249 | 33 |
| EV | 2007 | 7 | 24431 | 10360 | 42 |
| EV | 2007 | 6 | 24019 | 9711 | 40 |
| EV | 2007 | 11 | 23307 | 5066 | 21 |
| EV | 2007 | 3 | 23266 | 6066 | 26 |
| EV | 2007 | 5 | 23164 | 4523 | 19 |
| EV | 2007 | 12 | 22867 | 7510 | 32 |
| EV | 2007 | 4 | 22640 | 5832 | 25 |
| EV | 2007 | 9 | 22050 | 7450 | 33 |
| EV | 2007 | 1 | 21523 | 6170 | 28 |
| EV | 2007 | 2 | 20029 | 6927 | 34 |
| EV | 2008 | 7 | 25339 | 6788 | 26 |
| EV | 2008 | 8 | 24719 | 5541 | 22 |
| EV | 2008 | 6 | 24652 | 5240 | 21 |
| EV | 2008 | 3 | 23460 | 6624 | 28 |
| EV | 2008 | 5 | 23147 | 3504 | 15 |
| EV | 2008 | 4 | 23008 | 5008 | 21 |
| EV | 2008 | 11 | 22664 | 5246 | 23 |
| EV | 2008 | 12 | 22594 | 7772 | 34 |
| EV | 2008 | 1 | 21945 | 5353 | 24 |
| EV | 2008 | 2 | 21406 | 6176 | 28 |
| EV | 2008 | 10 | 21312 | 3909 | 18 |
| EV | 2008 | 9 | 20621 | 3117 | 15 |
| HA | 2003 | 12 | 3963 | 411 | 10 | 5.516129 | 2.732572 |
| HA | 2003 | 11 | 3829 | 233 | 6 |
| HA | 2004 | 8 | 4448 | 173 | 3 |
| HA | 2004 | 7 | 4437 | 121 | 2 |
| HA | 2004 | 6 | 4157 | 176 | 4 |
| HA | 2004 | 3 | 4036 | 293 | 7 |
| HA | 2004 | 5 | 3968 | 173 | 4 |
| HA | 2004 | 12 | 3954 | 218 | 5 |
| HA | 2004 | 4 | 3909 | 177 | 4 |
| HA | 2004 | 10 | 3851 | 162 | 4 |
| HA | 2004 | 1 | 3846 | 432 | 11 |
| HA | 2004 | 9 | 3799 | 109 | 2 |
| HA | 2004 | 11 | 3787 | 232 | 6 |
| HA | 2004 | 2 | 3703 | 330 | 8 |
| HA | 2005 | 7 | 4396 | 146 | 3 |
| HA | 2005 | 8 | 4379 | 102 | 2 |
| HA | 2005 | 6 | 4129 | 220 | 5 |
| HA | 2005 | 12 | 4069 | 224 | 5 |
| HA | 2005 | 10 | 4029 | 120 | 2 |
| HA | 2005 | 5 | 4013 | 144 | 3 |
| HA | 2005 | 9 | 3952 | 132 | 3 |
| HA | 2005 | 3 | 3915 | 340 | 8 |
| HA | 2005 | 1 | 3907 | 256 | 6 |
| HA | 2005 | 11 | 3888 | 173 | 4 |
| HA | 2005 | 4 | 3884 | 150 | 3 |
| HA | 2005 | 2 | 3551 | 123 | 3 |
| HA | 2006 | 7 | 4767 | 172 | 3 |
| HA | 2006 | 8 | 4737 | 162 | 3 |
| HA | 2006 | 12 | 4610 | 402 | 8 |
| HA | 2006 | 10 | 4468 | 282 | 6 |
| HA | 2006 | 11 | 4410 | 357 | 8 |
| HA | 2006 | 6 | 4406 | 198 | 4 |
| HA | 2006 | 9 | 4376 | 136 | 3 |
| HA | 2006 | 1 | 4139 | 160 | 3 |
| HA | 2006 | 3 | 4132 | 337 | 8 |
| HA | 2006 | 5 | 4119 | 179 | 4 |
| HA | 2006 | 4 | 4011 | 211 | 5 |
| HA | 2006 | 2 | 3738 | 190 | 5 |
| HA | 2007 | 7 | 5028 | 222 | 4 |
| HA | 2007 | 8 | 4995 | 268 | 5 |
| HA | 2007 | 6 | 4798 | 307 | 6 |
| HA | 2007 | 10 | 4697 | 219 | 4 |
| HA | 2007 | 5 | 4697 | 299 | 6 |
| HA | 2007 | 3 | 4682 | 266 | 5 |
| HA | 2007 | 12 | 4641 | 298 | 6 |
| HA | 2007 | 1 | 4611 | 347 | 7 |
| HA | 2007 | 9 | 4564 | 259 | 5 |
| HA | 2007 | 4 | 4554 | 194 | 4 |
| HA | 2007 | 11 | 4511 | 297 | 6 |
| HA | 2007 | 2 | 4157 | 329 | 7 |
| HA | 2008 | 12 | 5969 | 1039 | 17 |
| HA | 2008 | 11 | 5715 | 506 | 8 |
| HA | 2008 | 8 | 5548 | 361 | 6 |
| HA | 2008 | 7 | 5481 | 734 | 13 |
| HA | 2008 | 10 | 5405 | 482 | 8 |
| HA | 2008 | 6 | 5282 | 373 | 7 |
| HA | 2008 | 9 | 4879 | 216 | 4 |
| HA | 2008 | 5 | 4671 | 463 | 9 |
| HA | 2008 | 3 | 4666 | 206 | 4 |
| HA | 2008 | 1 | 4641 | 218 | 4 |
| HA | 2008 | 4 | 4579 | 380 | 8 |
| HA | 2008 | 2 | 4376 | 267 | 6 |

# Compute p-value

ANOVA

P= 4.1059403272e-39

Kruskall-Wallis H-test

P= 1.20170973441e-21

# Conclusion

We, therefore, have sufficient evidence to reject the null hypothesis. Our initial guess that a statistically significant difference existed in the means was backed by this statistical analysis. We have evidence to suggest that departure delay is related to carrier.

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