CITY OF URBANA
Human Resources Division

MEMORANDUM

To: Todd Rent, Chief Examiner and the Civil Service Commission

From: Human Resources staff

Re: Passing Score for Parking Enforcement Officer I

Date: October 28, 2015

INTRODUCTION

Staff requests that the Civil Service Commission set a passing score for Diplomat Customer Service at 57% for both the video and reading portions of the exam. This test will be used to establish a register which can be used for the Parking Enforcement Officer I position. If approved, this will result in a register consisting of 77 individuals with no adverse impact.

BACKGROUND

The position of Parking Enforcement Officer I were opened for applications from July 24 to August 28, 2015. A total of 253 applications were received, and 231 applicants were invited to test.

Of the 231 invited to test, 127 applicants (55%) attended one of the exams offered.

Exam Attendees					
Male	51	40.2%	Non-Minority	69	54.3%
Female	73	57.5%	Minority	51	40.2%
N/A	3	2.4%	N/A	7	5.5%
Total	127	100%	Total	127	100%

The exam offered was the Ergometrics Human Relations™ Video Test, which simulates working in a public sector customer service job. It is recommended for any job where employees interact with the public, including counter work, client assistance and field work. This test covers: customer communication style, handling customer problems, co-worker relations, teamwork, work habits, integrity, initiative, and management relations. Candidates were scored on both the video exam and a basic reading test. This exam battery was written and scored by Ergometrics & Applied Personnel Research, Inc., and has been professionally validated and have been shown to consistently have lower adverse impact than written tests.

	Video Exam	Reading Test
Highest score	85.88	100
Mean score	63.76	76.65
Lowest score	29.67	14.29

Based on statistical analyses of applicant demographics, City staff recommends the passing score be established at 57% for both the video exam and reading test components. This will result in a Civil Service Register of 77 candidates. Adverse and disparate impacts are not found at this proposed passing point. A demographic analysis is as follows:

50% Passing Score							
Gender	**#**	**% of Total**	**% of Like Group**	**Race**		**% of Total**	**% of Like Group**
Male	30	39.0%	58.8%	Non-Minority	43	55.8%	62.3%
Female	45	58.4%	61.6%	Minority	31	40.3%	60.8%
N/A	2	2.6%	66.7%	N/A	3	3.9%	42.9%
Total	77	100%		Total	77	100%	

REQUESTED ACTION

Staff requests the Civil Service Commission establish a passing point as discussed above to establish a register for Parking Enforcement Officer I.

Attachment: Disparate impact analysis at 57%.

Disparate Impact Analysis

(an On-Line Internet based application)

Instructions: Please fill out the information into the form below. Once you have entered your data below, you may select the types of analysis to be conducted by checking the appropriate boxes. Then press the compute button at the bottom of the form to view the results.

Select the type of employment decision: Selection

Enter a title for your report: 57.0% Passing Score (Parking Enforcement Officer)

Number of Male	Number of Non-Minority	Number of Younger	Number of Non-Disabled
51 Applicants	70 Applicants	Applicants	Applicants
29 Selected	43 Selected	Selected	Selected
Number of Female	**Number of Minority**	**Number of Older**	**Number of Disabled**
73 Applicants	50 Applicants	Applicants	Applicants
46 Selected	31 Selected	Selected	Selected

- ☑ -Adverse Impact
- ☑ -Chi-Square
- ☑ -Standard Deviation
- ☑ -Confidence Intervals
- ☑ Probability Distribution

Select the Statistical Tests you wish to execute by checking or unchecking the boxes on the left. Then press the 'Compute' button below.

Compute

Display: ☑ Description of Statistic ☑ Interpretation of Results

57.0% Passing Score (Parking Enforcement Officer)

Adverse-Impact Report

Adverse Impact **and the "four-fifths rule." - A selection rate for any race, sex, or ethnic group which is less than four-fifths (4/5ths) (or eighty percent) of the rate for the group with the highest rate will generally be regarded by the Federal enforcement agencies as evidence of adverse impact.** ***Uniform Guidelines on Employee Selection Procedures***

Rate of Females Applicants Selected	Rate of Males Applicants Selected	Adverse Impact Ratio for Females	Adverse Impact Ratio for Males
(46/ 73) = 0.6301	(29/ 51) = 0.5686	(0.6301/ 0.5686)= 1.11	(0.5686/ 0.6301)= 0.9
Adverse impact as defined by the 4/5ths rule was not found in the above data.			

Rate of Minorities Applicants Selected	Rate of Non-Minorities Applicants Selected	Adverse Impact Ratio for Minorities	Adverse Impact Ratio for Non-Minorities
(31/ 50) = 0.62	(43/ 70) = 0.6143	(0.62/ 0.6143)= 1.01	(0.6143/ 0.62)= 0.99
Adverse impact as defined by the 4/5ths rule was not found in the above data.			

Chi-Square Report

Observed Expected	Selected	Not Selected	Row Totals
Males	29 30.8468	22 20.1532	51
Females	46 44.1532	27 28.8468	73
Column Total	75	49	124

Chi-Square = 0.4753
The value of the statistic is less than 3.841. This indicates that there is a 95 percent chance that these results have been obtained absent any form of bias. Therefore, you may conclude that these results fall within normal random variations and are not the result of bias.

Observed Expected	Selected	Not Selected	Row Totals

Non-Minorities	43 43.1667	27 26.8333	70
Minorities	31 30.8333	19 19.1667	50
Column Total	74	46	120

Chi-Square = 0.004
The value of the statistic is less than 3.841. This indicates that there is a 95 percent chance that these results have been obtained absent any form of bias. Therefore, you may conclude that these results fall within normal random variations and are not the result of bias.

Standard-Deviation Report

The difference between the proportion of the protected class Selected and the proportion of all Applicants Selected has a normal distribution with a mean and standard deviation. The statistic is shown below:

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          (r / n) - p

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 sqrt(p * (1-p) / n) * sqrt(1-q)
```

Analysis of proportion of Females Selected **where:**

- **r = number of Females Selected.**
- **n = number of Selected (Females and Males).**
- **p = proportion of Applicants that are Females.**
- **q = proportion of Applicants Selected.**

	Selected	Not Selected	Row Totals
Males	29	22	51
Females	46	27	73
Column Total	75	49	124

r = 46
n = 75
p = 73 / 124 = 0.589
q = (46 + 29) / (73 + 51) = 0.605

Standard Deviation Statistic = 0.689

These results show that the proportion of Females Selected is 0.689 standard deviations above the proportion of Applicants Selected. A result of less than 2 standard deviations is generally considered non-significant.

Analysis of proportion of Minorities Selected **where:**

- **r = number of Minorities Selected.**
- **n = number of Selected (Minorities and Non-Minorities).**
- **p = proportion of Applicants that are Minorities.**
- **q = proportion of Applicants Selected.**

	Selected	Not Selected	Row Totals
Non-Minorities	43	27	70
Minorities	31	19	50
Column Total	74	46	120

r = 31
n = 74
p = 50 / 120 = 0.417
q = (31 + 43) / (50 + 70) = 0.617

Standard Deviation Statistic = 0.063

These results show that the proportion of Minorities Selected is 0.063 standard deviations above the proportion of Applicants Selected. A result of less than 2 standard deviations is generally considered non-significant.

Confidence Interval Report

The proportion of the protected class Selected has an expected value that would fall within a specified confidence interval.
The statistic is shown below:
Observed value = (r / n)
Expected value = p

Standard Deviation = sqrt(p * (1-p) / n) * sqrt(1-q)

Confidence Interval:
Lower Bound = p - 1.96 * Std Dev
Upper Bound = p + 1.96 * Std Dev

Analysis of proportion of Females Applicants Selected **where:**

- **r = number of Females Selected.**
- **n = number of Applicants Selected.**
- **p = proportion of Females among those Selected.**
- **q = proportion of Applicants Selected.**

r = 46
n = 75
p = (73/(73+51))=0.589
q = ((46 + 29)/(73 + 51))=0.605
(r/n)=46/75=0.6133

The lower bound of the confidence interval is: 0.589 -(1.96* 0.036)= 0.5187
The upper bound of the confidence interval is: 0.589 +(1.96* 0.036)= 0.6587

Confidence Interval = 0.5187 to 0.6587

These results show that the proportion of Females Females (r/n=0.6133) is contained in the confidence interval. Therefore a finding of disparate impact is not supported by this data.

Analysis of proportion of Minorities Applicants Selected **where:**

- **r = number of Minorities Selected.**
- **n = number of Applicants Selected.**
- **p = proportion of Minorities among those Selected.**
- **q = proportion of Applicants Selected.**

r = 31
n = 74
p = (50/(50+70))=0.417
q = ((31 + 43)/(50 + 70))=0.617
(r/n)=31/74=0.4189

The lower bound of the confidence interval is: 0.417 -(1.96* 0.035)= 0.3471
The upper bound of the confidence interval is: 0.417 +(1.96* 0.035)= 0.4862

Confidence Interval = 0.3471 to 0.4862

These results show that the proportion of Minorities Minorities (r/n=0.4189) is contained in the confidence interval. Therefore a finding of disparate impact is not supported by this data.

Probability Distribution Report

Number Females Selected	Number Males Selected	Rate of Females Applicants Selected	Rate of Males Applicants Selected	Adverse Impact Ratio of Females	Adverse Impact against Females ?	Probability	Cumulative Probability
24	51	(24/73)	(51/51)	0.3288	YES	0	0
25	50	(25/73)	(50/51)	0.3493	YES	0	0
26	49	(26/73)	(49/51)	0.3707	YES	0	0
27	48	(27/73)	(48/51)	0.393	YES	0	0
28	47	(28/73)	(47/51)	0.4162	YES	0	0
29	46	(29/73)	(46/51)	0.4404	YES	0	0
30	45	(30/73)	(45/51)	0.4658	YES	0	0
31	44	(31/73)	(44/51)	0.4922	YES	0	0.000001
32	43	(32/73)	(43/51)	0.5199	YES	0.000003	0.000004
33	42	(33/73)	(42/51)	0.5489	YES	0.000019	0.000023
34	41	(34/73)	(41/51)	0.5794	YES	0.000095	0.000118

35	40	(35/73)	(40/51)	0.6113	YES	0.000395	0.000513
36	39	(36/73)	(39/51)	0.6449	YES	0.001389	0.001901
37	38	(37/73)	(38/51)	0.6802	YES	0.004166	0.006068
38	37	(38/73)	(37/51)	0.7175	YES	0.010713	0.016781
39	36	(39/73)	(36/51)	0.7568	YES	0.023715	0.040496
40	35	(40/73)	(35/51)	0.7984	YES	0.045356	0.085852
41	34	(41/73)	(34/51)	0.8425	NO	0.075159	0.161011
42	33	(42/73)	(33/51)	0.8892	NO	0.108165	0.269176
43	32	(43/73)	(32/51)	0.9388	NO	0.135438	0.404614
44	31	(44/73)	(31/51)	0.9916	NO	0.147751	0.552365
45	30	(45/73)	(30/51)	1.0479	NO	0.140559	0.692924
Selected-> 46	29	(46/73)	(29/51)	1.1082	NO	0.116669	0.809593
47	28	(47/73)	(28/51)	1.1727	NO	0.084507	0.8941
48	27	(48/73)	(27/51)	1.242	NO	0.053404	0.947504
49	26	(49/73)	(26/51)	1.3166	NO	0.029427	0.976931
50	25	(50/73)	(25/51)	1.3973	NO	0.014125	0.991055
51	24	(51/73)	(24/51)	1.4846	NO	0.005898	0.996953
52	23	(52/73)	(23/51)	1.5795	NO	0.002139	0.999092
53	22	(53/73)	(22/51)	1.6831	NO	0.000672	0.999764
54	21	(54/73)	(21/51)	1.7965	NO	0.000183	0.999947
55	20	(55/73)	(20/51)	1.9212	NO	0.000043	0.99999
56	19	(56/73)	(19/51)	2.0591	NO	0.000009	0.999998
57	18	(57/73)	(18/51)	2.2123	NO	0.000001	1
58	17	(58/73)	(17/51)	2.3836	NO	0	1
59	16	(59/73)	(16/51)	2.5762	NO	0	1
60	15	(60/73)	(15/51)	2.7945	NO	0	1
61	14	(61/73)	(14/51)	3.044	NO	0	1
62	13	(62/73)	(13/51)	3.3319	NO	0	1
63	12	(63/73)	(12/51)	3.6678	NO	0	1
64	11	(64/73)	(11/51)	4.0648	NO	0	1
65	10	(65/73)	(10/51)	4.5411	NO	0	1
66	9	(66/73)	(9/51)	5.1233	NO	0	1
67	8	(67/73)	(8/51)	5.851	NO	0	1
68	7	(68/73)	(7/51)	6.7867	NO	0	1
69	6	(69/73)	(6/51)	8.0342	NO	0	1
70	5	(70/73)	(5/51)	9.7808	NO	0	1
71	4	(71/73)	(4/51)	12.4007	NO	0	1
72	3	(72/73)	(3/51)	16.7671	NO	0	1
73	2	(73/73)	(2/51)	25.5	NO	0	1

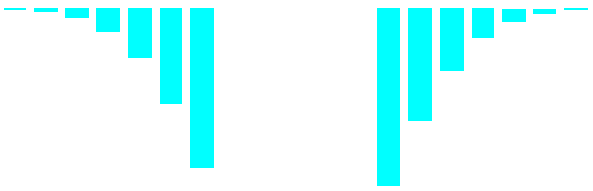
Given that 75 were Selected from a pool of 51 Males and 73 Females it was possible to have Selected from 24 to 73 Females.

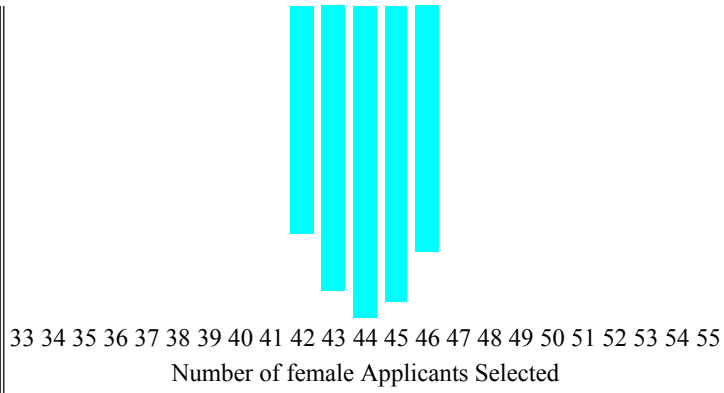
Adverse Impact would be found if you Selected 40 or fewer Females.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0.0859 (the sum of the probabilities of having Selected 40 or fewer Females).

Since the probability of Adverse Impact occurring even if the selection was random (i.e. unbiased) is less than 10%, an observed Adverse Impact may be significant since there is a low probability that Adverse Impact would have occurred by chance.

Probability Distribution of the variable: Number of Females Selected.



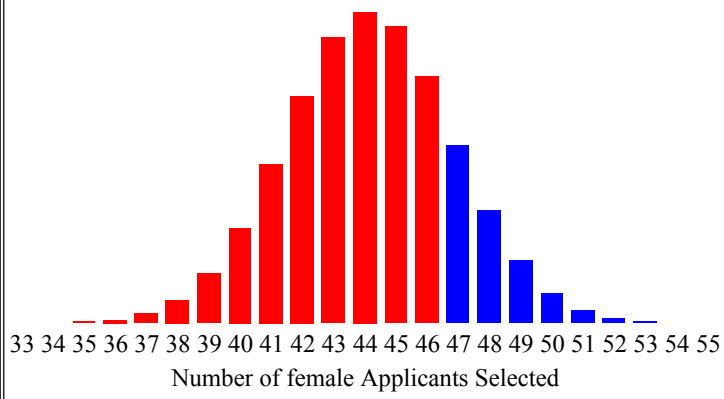


The probability distribution of having Selected from 24 to 73 Females is displayed above. The graph above is shown starting with 33 since the probabilities below this point are near zero. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 44 female Applicants. This represents the mean of the probability distribution. Approximately half of the probability distribution is above this point and approximately half is below this point. The total area contained in the probability distribution is equal to 1. Thus, probabilities for each number of female Applicants Selected are a fraction of the total probability distribution. The larger areas of the distribution represent higher probabilities of occurance. Adding the individual probabilities up to a certain point enable you to compute the probability of having Selected that many or fewer female Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more female Applicants.

The characteristics of the probability distribution--its mean and standard deviation--are a function of the number of female and male Applicants and the number of Applicants to be Selected. Though it is possible to have Selected from 24 to 73 female Applicants, the individual probabilities of having Selected each number of female Applicants can be computed and accumulated. As noted before, these individual probabilities are a function of the number of female and male Applicants and the number of Applicants to be Selected.

Using the distribution above, a 90 percent confidence interval on the variable 'Number of Females Selected' would have a lower bound of 40 and an upper bound of 49.

The significance of having Selected 46 or fewer Females is graphically displayed below.



As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected 40 *or fewer* female Applicants.

You have Selected 46 female Applicants. The probability of having Selected 46 *or fewer* Females is equal to the cumulative probability for having Selected 46 Females Applicants. The cumulative probability of having Selected 46 female Applicants is 0.8096 and is graphically displayed, in red, above.

Since the probability is greater than 10%, we are unable to reject the hypothesis that the decisions occurred due to chance. Therefore, we must conclude that it is entirely possible that having Selected 46 or fewer female Applicants is an event that occurred due to chance and not from discriminatory actions by the employer.

Number Minorities Selected	Number Non-Minorities Selected	Rate of Minorities Applicants Selected	Rate of Non-Minorities Applicants Selected	Adverse Impact Ratio of Minorities	Adverse Impact against Minorities ?	Probability	Cumulative Probability
4	70	(4/50)	(70/70)	0.08	YES	0	0
5	69	(5/50)	(69/70)	0.1014	YES	0	0
6	68	(6/50)	(68/70)	0.1235	YES	0	0
7	67	(7/50)	(67/70)	0.1463	YES	0	0
8	66	(8/50)	(66/70)	0.1697	YES	0	0
9	65	(9/50)	(65/70)	0.1938	YES	0	0

10	64	(10/50)	(64/70)	0.2188	YES	0	0
11	63	(11/50)	(63/70)	0.2444	YES	0	0
12	62	(12/50)	(62/70)	0.271	YES	0	0
13	61	(13/50)	(61/70)	0.2984	YES	0	0
14	60	(14/50)	(60/70)	0.3267	YES	0	0
15	59	(15/50)	(59/70)	0.3559	YES	0	0
16	58	(16/50)	(58/70)	0.3862	YES	0	0
17	57	(17/50)	(57/70)	0.4175	YES	0	0
18	56	(18/50)	(56/70)	0.45	YES	0.000001	0.000001
19	55	(19/50)	(55/70)	0.4836	YES	0.000006	0.000007
20	54	(20/50)	(54/70)	0.5185	YES	0.000032	0.000039
21	53	(21/50)	(53/70)	0.5547	YES	0.000144	0.000183
22	52	(22/50)	(52/70)	0.5923	YES	0.00056	0.000743
23	51	(23/50)	(51/70)	0.6314	YES	0.001866	0.00261
24	50	(24/50)	(50/70)	0.672	YES	0.005354	0.007964
25	49	(25/50)	(49/70)	0.7143	YES	0.013258	0.021221
26	48	(26/50)	(48/70)	0.7583	YES	0.028393	0.049614
27	47	(27/50)	(47/70)	0.8043	NO	0.05267	0.102284
28	46	(28/50)	(46/70)	0.8522	NO	0.084727	0.187012
29	45	(29/50)	(45/70)	0.9022	NO	0.118268	0.305279
30	44	(30/50)	(44/70)	0.9545	NO	0.143286	0.448565
Selected-> 31	43	(31/50)	(43/70)	1.0093	NO	0.150647	0.599212
32	42	(32/50)	(42/70)	1.0667	NO	0.137364	0.736577
33	41	(33/50)	(41/70)	1.1268	NO	0.108514	0.84509
34	40	(34/50)	(40/70)	1.19	NO	0.074151	0.919241
35	39	(35/50)	(39/70)	1.2564	NO	0.043739	0.96298
36	38	(36/50)	(38/70)	1.3263	NO	0.022211	0.985191
37	37	(37/50)	(37/70)	1.4	NO	0.009678	0.994869
38	36	(38/50)	(36/70)	1.4778	NO	0.003603	0.998472
39	35	(39/50)	(35/70)	1.56	NO	0.00114	0.999612
40	34	(40/50)	(34/70)	1.6471	NO	0.000305	0.999917
41	33	(41/50)	(33/70)	1.7394	NO	0.000068	0.999985
42	32	(42/50)	(32/70)	1.8375	NO	0.000013	0.999998
43	31	(43/50)	(31/70)	1.9419	NO	0.000002	1
44	30	(44/50)	(30/70)	2.0533	NO	0	1
45	29	(45/50)	(29/70)	2.1724	NO	0	1
46	28	(46/50)	(28/70)	2.3	NO	0	1
47	27	(47/50)	(27/70)	2.437	NO	0	1
48	26	(48/50)	(26/70)	2.5846	NO	0	1
49	25	(49/50)	(25/70)	2.744	NO	0	1
50	24	(50/50)	(24/70)	2.9167	NO	0	1

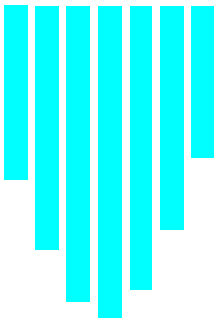
Given that 74 were Selected from a pool of 70 Non-Minorities and 50 Minorities it was possible to have Selected from 4 to 50 Minorities.

Adverse Impact would be found if you Selected 26 or fewer Minorities.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0.0496 (the sum of the probabilities of having Selected 26 or fewer Minorities).

Since the probability of Adverse Impact occurring even if the selection was random (i.e. unbiased) is less than 10%, an observed Adverse Impact may be significant since there is a low probability that Adverse Impact would have occurred by chance.

Probability Distribution of the variable: Number of Minorities Selected.



20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

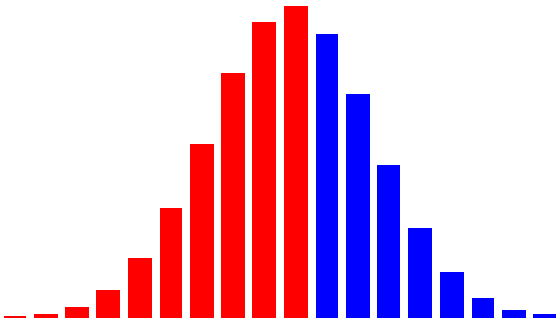
Number of minority Applicants Selected

The probability distribution of having Selected from 4 to 50 Minorities is displayed above. The graph above is shown starting with 20 since the probabilities below this point are near zero. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 31 minority Applicants. This represents the mean of the probability distribution. Approximately half of the probability distribution is above this point and approximately half is below this point. The total area contained in the probability distribution is equal to 1. Thus, probabilities for each number of minority Applicants Selected are a fraction of the total probability distribution. The larger areas of the distribution represent higher probabilities of occurance. Adding the individual probabilities up to a certain point enable you to compute the probability of having Selected that many or fewer minority Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more minority Applicants.

The characteristics of the probability distribution--its mean and standard deviation--are a function of the number of minority and non-minority Applicants and the number of Applicants to be Selected. Though it is possible to have Selected from 4 to 50 minority Applicants, the individual probabilities of having Selected each number of minority Applicants can be computed and accumulated. As noted before, these individual probabilities are a function of the number of minority and non-minority Applicants and the number of Applicants to be Selected.

Using the distribution above, a 90 percent confidence interval on the variable 'Number of Minorities Selected' would have a lower bound of 27 and an upper bound of 35.

The significance of having Selected 31 or fewer Minorities is graphically displayed below.



20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

Number of minority Applicants Selected

As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected 26 *or fewer* minority Applicants.

You have Selected 31 minority Applicants. The probability of having Selected 31 *or fewer* Minorities is equal to the cumulative probability for having Selected 31 Minorities Applicants. The cumulative probability of having Selected 31 minority Applicants is 0.5992 and is graphically displayed, in red, above.

Since the probability is greater than 10%, we are unable to reject the hypothesis that the decisions occurred due to chance. Therefore, we must conclude that it is entirely possible that having Selected 31 or fewer minority Applicants is an event that occurred due to chance and not from discriminatory actions by the employer.

View Source Code

Send questions or comments to webmaster@hr-guide.com. Thank you.