# Online Supplement

# *Simulation 1*

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| *Type I Error Rates with Normal Data for* | | | | | |
| Predictors | *N* | ML | Bayes | MLR | Bayes Y–J |
| 1 | 50 | 0.109 | 0.088 | 0.130 | 0.087 |
| 1 | 100 | 0.103 | 0.092 | 0.115 | 0.095 |
| 1 | 150 | 0.097 | 0.089 | 0.103 | 0.091 |
| 1 | 250 | 0.097 | 0.091 | 0.103 | 0.090 |
| 1 | 500 | 0.097 | 0.096 | 0.101 | 0.097 |
| 1 | 1000 | 0.108 | 0.108 | 0.110 | 0.108 |
| 2 | 50 | 0.127 | 0.096 | 0.159 | 0.098 |
| 2 | 100 | 0.107 | 0.095 | 0.127 | 0.093 |
| 2 | 150 | 0.104 | 0.093 | 0.119 | 0.093 |
| 2 | 250 | 0.101 | 0.096 | 0.110 | 0.096 |
| 2 | 500 | 0.115 | 0.113 | 0.122 | 0.113 |
| 2 | 1000 | 0.096 | 0.094 | 0.101 | 0.097 |
| 5 | 50 | 0.155 | 0.086 | 0.278 | 0.084 |
| 5 | 100 | 0.126 | 0.093 | 0.186 | 0.091 |
| 5 | 150 | 0.127 | 0.104 | 0.164 | 0.100 |
| 5 | 250 | 0.113 | 0.101 | 0.132 | 0.100 |
| 5 | 500 | 0.106 | 0.100 | 0.119 | 0.097 |
| 5 | 1000 | 0.105 | 0.099 | 0.110 | 0.098 |
| 10 | 50 | 0.292 | 0.098 | 0.557 | 0.096 |
| 10 | 100 | 0.182 | 0.105 | 0.336 | 0.102 |
| 10 | 150 | 0.147 | 0.101 | 0.246 | 0.101 |
| 10 | 250 | 0.134 | 0.101 | 0.194 | 0.104 |
| 10 | 500 | 0.116 | 0.099 | 0.141 | 0.102 |
| 10 | 1000 | 0.106 | 0.099 | 0.123 | 0.102 |

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| *Type I Error Rates with Normal Data for* | | | | | |
| Predictors | *N* | ML | Bayes | MLR | Bayes Y–J |
| 1 | 50 | 0.012 | 0.007 | 0.017 | 0.007 |
| 1 | 100 | 0.013 | 0.010 | 0.013 | 0.012 |
| 1 | 150 | 0.008 | 0.007 | 0.011 | 0.005 |
| 1 | 250 | 0.012 | 0.012 | 0.016 | 0.013 |
| 1 | 500 | 0.010 | 0.010 | 0.012 | 0.011 |
| 1 | 1000 | 0.010 | 0.010 | 0.010 | 0.010 |
| 2 | 50 | 0.015 | 0.010 | 0.032 | 0.009 |
| 2 | 100 | 0.013 | 0.010 | 0.019 | 0.010 |
| 2 | 150 | 0.010 | 0.009 | 0.015 | 0.008 |
| 2 | 250 | 0.012 | 0.012 | 0.017 | 0.011 |
| 2 | 500 | 0.013 | 0.012 | 0.016 | 0.013 |
| 2 | 1000 | 0.009 | 0.009 | 0.010 | 0.008 |
| 5 | 50 | 0.035 | 0.012 | 0.082 | 0.012 |
| 5 | 100 | 0.014 | 0.009 | 0.038 | 0.009 |
| 5 | 150 | 0.018 | 0.014 | 0.027 | 0.014 |
| 5 | 250 | 0.015 | 0.011 | 0.020 | 0.011 |
| 5 | 500 | 0.012 | 0.012 | 0.016 | 0.013 |
| 5 | 1000 | 0.012 | 0.012 | 0.013 | 0.012 |
| 10 | 50 | 0.096 | 0.014 | 0.325 | 0.011 |
| 10 | 100 | 0.035 | 0.015 | 0.111 | 0.014 |
| 10 | 150 | 0.023 | 0.014 | 0.059 | 0.012 |
| 10 | 250 | 0.015 | 0.010 | 0.036 | 0.009 |
| 10 | 500 | 0.011 | 0.007 | 0.020 | 0.008 |
| 10 | 1000 | 0.008 | 0.008 | 0.013 | 0.008 |

***Simulation 2***

*Power Estimates with Normal Data for*



*Power Estimates with Normal Data for*



*Power Estimates with Normal Data for*



# *Simulation 3*

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| *Type I Error Rates with Nonnormal Data for* | | | | | | | | | | |
|  |  | Moderate Nonnormal | | | |  | Extreme Nonnormal | | | |
| Predictors | *N* | ML | Bayes | MLR | Bayes Y–J |  | ML | Bayes | MLR | Bayes Y–J |
| 1 | 50 | 0.106 | 0.086 | 0.120 | 0.086 |  | 0.108 | 0.087 | 0.108 | 0.086 |
| 1 | 100 | 0.111 | 0.098 | 0.120 | 0.093 |  | 0.112 | 0.101 | 0.112 | 0.094 |
| 1 | 150 | 0.091 | 0.086 | 0.102 | 0.090 |  | 0.091 | 0.084 | 0.091 | 0.090 |
| 1 | 250 | 0.096 | 0.092 | 0.101 | 0.089 |  | 0.097 | 0.094 | 0.097 | 0.090 |
| 1 | 500 | 0.113 | 0.108 | 0.104 | 0.095 |  | 0.108 | 0.107 | 0.108 | 0.096 |
| 1 | 1000 | 0.106 | 0.105 | 0.110 | 0.107 |  | 0.110 | 0.108 | 0.110 | 0.107 |
| 2 | 50 | 0.126 | 0.090 | 0.137 | 0.097 |  | 0.125 | 0.091 | 0.125 | 0.097 |
| 2 | 100 | 0.113 | 0.101 | 0.117 | 0.094 |  | 0.119 | 0.101 | 0.119 | 0.094 |
| 2 | 150 | 0.106 | 0.092 | 0.113 | 0.090 |  | 0.100 | 0.091 | 0.100 | 0.090 |
| 2 | 250 | 0.102 | 0.095 | 0.106 | 0.096 |  | 0.097 | 0.091 | 0.097 | 0.096 |
| 2 | 500 | 0.107 | 0.101 | 0.111 | 0.112 |  | 0.111 | 0.106 | 0.111 | 0.113 |
| 2 | 1000 | 0.103 | 0.099 | 0.104 | 0.095 |  | 0.104 | 0.102 | 0.104 | 0.096 |
| 5 | 50 | 0.169 | 0.087 | 0.211 | 0.086 |  | 0.167 | 0.086 | 0.167 | 0.086 |
| 5 | 100 | 0.130 | 0.093 | 0.146 | 0.087 |  | 0.129 | 0.094 | 0.129 | 0.088 |
| 5 | 150 | 0.122 | 0.099 | 0.127 | 0.099 |  | 0.120 | 0.096 | 0.120 | 0.099 |
| 5 | 250 | 0.118 | 0.102 | 0.119 | 0.099 |  | 0.113 | 0.102 | 0.113 | 0.099 |
| 5 | 500 | 0.121 | 0.110 | 0.114 | 0.096 |  | 0.113 | 0.106 | 0.113 | 0.096 |
| 5 | 1000 | 0.105 | 0.101 | 0.103 | 0.098 |  | 0.108 | 0.107 | 0.108 | 0.098 |
| 10 | 50 | 0.300 | 0.097 | 0.426 | 0.091 |  | 0.298 | 0.102 | 0.298 | 0.091 |
| 10 | 100 | 0.187 | 0.099 | 0.239 | 0.097 |  | 0.189 | 0.099 | 0.189 | 0.098 |
| 10 | 150 | 0.151 | 0.106 | 0.177 | 0.097 |  | 0.151 | 0.103 | 0.151 | 0.097 |
| 10 | 250 | 0.126 | 0.098 | 0.145 | 0.103 |  | 0.125 | 0.097 | 0.125 | 0.103 |
| 10 | 500 | 0.129 | 0.113 | 0.137 | 0.102 |  | 0.124 | 0.109 | 0.124 | 0.103 |
| 10 | 1000 | 0.111 | 0.104 | 0.107 | 0.102 |  | 0.105 | 0.101 | 0.105 | 0.102 |

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| *Type I Error Rates with Nonnormal Data for* | | | | | | | | | | |
|  |  | Moderate Nonnormal | | | |  | Extreme Nonnormal | | | |
| Predictors | *N* | ML | Bayes | MLR | Bayes Y–J |  | ML | Bayes | MLR | Bayes Y–J |
| 1 | 50 | 0.009 | 0.007 | 0.011 | 0.007 |  | 0.009 | 0.006 | 0.013 | 0.007 |
| 1 | 100 | 0.015 | 0.011 | 0.008 | 0.012 |  | 0.013 | 0.011 | 0.010 | 0.012 |
| 1 | 150 | 0.008 | 0.008 | 0.009 | 0.006 |  | 0.008 | 0.007 | 0.009 | 0.006 |
| 1 | 250 | 0.015 | 0.014 | 0.011 | 0.012 |  | 0.014 | 0.014 | 0.012 | 0.012 |
| 1 | 500 | 0.008 | 0.008 | 0.009 | 0.011 |  | 0.009 | 0.009 | 0.009 | 0.011 |
| 1 | 1000 | 0.009 | 0.008 | 0.009 | 0.010 |  | 0.010 | 0.010 | 0.010 | 0.010 |
| 2 | 50 | 0.020 | 0.010 | 0.023 | 0.008 |  | 0.020 | 0.009 | 0.026 | 0.009 |
| 2 | 100 | 0.020 | 0.012 | 0.014 | 0.009 |  | 0.020 | 0.014 | 0.016 | 0.009 |
| 2 | 150 | 0.013 | 0.013 | 0.011 | 0.009 |  | 0.014 | 0.013 | 0.012 | 0.009 |
| 2 | 250 | 0.012 | 0.012 | 0.009 | 0.011 |  | 0.012 | 0.011 | 0.010 | 0.012 |
| 2 | 500 | 0.010 | 0.011 | 0.013 | 0.013 |  | 0.012 | 0.011 | 0.014 | 0.013 |
| 2 | 1000 | 0.012 | 0.012 | 0.009 | 0.008 |  | 0.011 | 0.011 | 0.009 | 0.008 |
| 5 | 50 | 0.032 | 0.011 | 0.050 | 0.012 |  | 0.034 | 0.011 | 0.059 | 0.013 |
| 5 | 100 | 0.017 | 0.010 | 0.020 | 0.008 |  | 0.018 | 0.009 | 0.022 | 0.008 |
| 5 | 150 | 0.016 | 0.009 | 0.016 | 0.013 |  | 0.015 | 0.010 | 0.020 | 0.013 |
| 5 | 250 | 0.016 | 0.013 | 0.014 | 0.011 |  | 0.016 | 0.012 | 0.015 | 0.010 |
| 5 | 500 | 0.012 | 0.011 | 0.011 | 0.012 |  | 0.012 | 0.012 | 0.013 | 0.012 |
| 5 | 1000 | 0.016 | 0.016 | 0.015 | 0.012 |  | 0.018 | 0.016 | 0.016 | 0.012 |
| 10 | 50 | 0.091 | 0.018 | 0.192 | 0.011 |  | 0.092 | 0.015 | 0.221 | 0.011 |
| 10 | 100 | 0.033 | 0.010 | 0.056 | 0.013 |  | 0.033 | 0.009 | 0.070 | 0.014 |
| 10 | 150 | 0.028 | 0.016 | 0.034 | 0.013 |  | 0.028 | 0.014 | 0.040 | 0.012 |
| 10 | 250 | 0.020 | 0.011 | 0.021 | 0.009 |  | 0.019 | 0.013 | 0.027 | 0.009 |
| 10 | 500 | 0.014 | 0.011 | 0.012 | 0.008 |  | 0.013 | 0.012 | 0.014 | 0.008 |
| 10 | 1000 | 0.010 | 0.010 | 0.011 | 0.007 |  | 0.012 | 0.012 | 0.011 | 0.007 |

# *Simulation 4*

*Power Estimates with Moderate Nonnormal Data for*



*Power Estimates with Moderate Nonnormal Data for*



*Power Estimates with Moderate Nonnormal Data for*



*Power Estimates with Extreme Nonnormal Data for*



*Power Estimates with Moderate Nonnormal Data for*



*Power Estimates with Moderate Nonnormal Data for*

