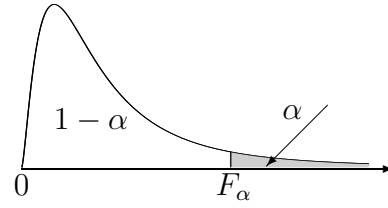


Table A7. F-distribution

F_α ; critical values such that $P\{F > F_\alpha\} = \alpha$



| ν_2 , denom. d.f. | α | ν_1 , numerator degrees of freedom | | | | | | | | | |
|-----------------------------|----------|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | 0.25 | 5.83 | 7.5 | 8.2 | 8.58 | 8.82 | 8.98 | 9.1 | 9.19 | 9.26 | 9.32 |
| | 0.1 | 39.9 | 49.5 | 53.6 | 55.8 | 57.2 | 58.2 | 58.9 | 59.4 | 59.9 | 60.2 |
| | 0.05 | 161 | 199 | 216 | 225 | 230 | 234 | 237 | 239 | 241 | 242 |
| | 0.025 | 648 | 799 | 864 | 900 | 922 | 937 | 948 | 957 | 963 | 969 |
| | 0.01 | 4052 | 4999 | 5403 | 5625 | 5764 | 5859 | 5928 | 5981 | 6022 | 6056 |
| | 0.005 | 16211 | 19999 | 21615 | 22500 | 23056 | 23437 | 23715 | 23925 | 24091 | 24224 |
| 2 | 0.001 | 405284 | 499999 | 540379 | 562500 | 576405 | 585937 | 592873 | 598144 | 602284 | 605621 |
| | 0.25 | 2.57 | 3 | 3.15 | 3.23 | 3.28 | 3.31 | 3.34 | 3.35 | 3.37 | 3.38 |
| | 0.1 | 8.53 | 9 | 9.16 | 9.24 | 9.29 | 9.33 | 9.35 | 9.37 | 9.38 | 9.39 |
| | 0.05 | 18.5 | 19 | 19.2 | 19.2 | 19.3 | 19.3 | 19.4 | 19.4 | 19.4 | 19.4 |
| | 0.025 | 38.5 | 39 | 39.2 | 39.2 | 39.3 | 39.3 | 39.4 | 39.4 | 39.4 | 39.4 |
| | 0.01 | 98.5 | 99 | 99.2 | 99.2 | 99.3 | 99.3 | 99.4 | 99.4 | 99.4 | 99.4 |
| 3 | 0.005 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 |
| | 0.001 | 999 | 999 | 999 | 999 | 999 | 999 | 999 | 999 | 999 | 999 |
| | 0.25 | 2.02 | 2.28 | 2.36 | 2.39 | 2.41 | 2.42 | 2.43 | 2.44 | 2.44 | 2.44 |
| | 0.1 | 5.54 | 5.46 | 5.39 | 5.34 | 5.31 | 5.28 | 5.27 | 5.25 | 5.24 | 5.23 |
| | 0.05 | 10.1 | 9.55 | 9.28 | 9.12 | 9.01 | 8.94 | 8.89 | 8.85 | 8.81 | 8.79 |
| | 0.025 | 17.4 | 16 | 15.4 | 15.1 | 14.9 | 14.7 | 14.6 | 14.5 | 14.5 | 14.4 |
| 4 | 0.01 | 34.1 | 30.8 | 29.5 | 28.7 | 28.2 | 27.9 | 27.7 | 27.5 | 27.3 | 27.2 |
| | 0.005 | 55.6 | 49.8 | 47.5 | 46.2 | 45.4 | 44.8 | 44.4 | 44.1 | 43.9 | 43.7 |
| | 0.001 | 167 | 149 | 141 | 137 | 135 | 133 | 132 | 131 | 130 | 129 |
| | 0.25 | 1.81 | 2 | 2.05 | 2.06 | 2.07 | 2.08 | 2.08 | 2.08 | 2.08 | 2.08 |
| | 0.1 | 4.54 | 4.32 | 4.19 | 4.11 | 4.05 | 4.01 | 3.98 | 3.95 | 3.94 | 3.92 |
| | 0.05 | 7.71 | 6.94 | 6.59 | 6.39 | 6.26 | 6.16 | 6.09 | 6.04 | 6 | 5.96 |
| 5 | 0.025 | 12.2 | 10.6 | 9.98 | 9.6 | 9.36 | 9.2 | 9.07 | 8.98 | 8.9 | 8.84 |
| | 0.01 | 21.2 | 18 | 16.7 | 16 | 15.5 | 15.2 | 15 | 14.8 | 14.7 | 14.5 |
| | 0.005 | 31.3 | 26.3 | 24.3 | 23.2 | 22.5 | 22 | 21.6 | 21.4 | 21.1 | 21 |
| | 0.001 | 74.1 | 61.2 | 56.2 | 53.4 | 51.7 | 50.5 | 49.7 | 49 | 48.5 | 48.1 |
| | 0.25 | 1.69 | 1.85 | 1.88 | 1.89 | 1.89 | 1.89 | 1.89 | 1.89 | 1.89 | 1.89 |
| | 0.1 | 4.06 | 3.78 | 3.62 | 3.52 | 3.45 | 3.4 | 3.37 | 3.34 | 3.32 | 3.3 |
| 6 | 0.05 | 6.61 | 5.79 | 5.41 | 5.19 | 5.05 | 4.95 | 4.88 | 4.82 | 4.77 | 4.74 |
| | 0.025 | 10 | 8.43 | 7.76 | 7.39 | 7.15 | 6.98 | 6.85 | 6.76 | 6.68 | 6.62 |
| | 0.01 | 16.3 | 13.3 | 12.1 | 11.4 | 11 | 10.7 | 10.5 | 10.3 | 10.2 | 10.1 |
| | 0.005 | 22.8 | 18.3 | 16.5 | 15.6 | 14.9 | 14.5 | 14.2 | 14 | 13.8 | 13.6 |
| | 0.001 | 47.2 | 37.1 | 33.2 | 31.1 | 29.8 | 28.8 | 28.2 | 27.6 | 27.2 | 26.9 |
| | 0.25 | 1.62 | 1.76 | 1.78 | 1.79 | 1.79 | 1.78 | 1.78 | 1.78 | 1.77 | 1.77 |
| 8 | 0.1 | 3.78 | 3.46 | 3.29 | 3.18 | 3.11 | 3.05 | 3.01 | 2.98 | 2.96 | 2.94 |
| | 0.05 | 5.99 | 5.14 | 4.76 | 4.53 | 4.39 | 4.28 | 4.21 | 4.15 | 4.1 | 4.06 |
| | 0.025 | 8.81 | 7.26 | 6.6 | 6.23 | 5.99 | 5.82 | 5.7 | 5.6 | 5.52 | 5.46 |
| | 0.01 | 13.7 | 10.9 | 9.78 | 9.15 | 8.75 | 8.47 | 8.26 | 8.1 | 7.98 | 7.87 |
| | 0.005 | 18.6 | 14.5 | 12.9 | 12 | 11.5 | 11.1 | 10.8 | 10.6 | 10.4 | 10.3 |
| | 0.001 | 35.5 | 27 | 23.7 | 21.9 | 20.8 | 20 | 19.5 | 19 | 18.7 | 18.4 |
| 10 | 0.25 | 1.54 | 1.66 | 1.67 | 1.66 | 1.66 | 1.65 | 1.64 | 1.64 | 1.63 | 1.63 |
| | 0.1 | 3.46 | 3.11 | 2.92 | 2.81 | 2.73 | 2.67 | 2.62 | 2.59 | 2.56 | 2.54 |
| | 0.05 | 5.32 | 4.46 | 4.07 | 3.84 | 3.69 | 3.58 | 3.5 | 3.44 | 3.39 | 3.35 |
| | 0.025 | 7.57 | 6.06 | 5.42 | 5.05 | 4.82 | 4.65 | 4.53 | 4.43 | 4.36 | 4.3 |
| | 0.01 | 11.3 | 8.65 | 7.59 | 7.01 | 6.63 | 6.37 | 6.18 | 6.03 | 5.91 | 5.81 |
| | 0.005 | 14.7 | 11 | 9.6 | 8.81 | 8.3 | 7.95 | 7.69 | 7.5 | 7.34 | 7.21 |
| 10 | 0.001 | 25.4 | 18.5 | 15.8 | 14.4 | 13.5 | 12.9 | 12.4 | 12 | 11.8 | 11.5 |
| | 0.25 | 1.49 | 1.6 | 1.6 | 1.59 | 1.59 | 1.58 | 1.57 | 1.56 | 1.56 | 1.55 |
| | 0.1 | 3.29 | 2.92 | 2.73 | 2.61 | 2.52 | 2.46 | 2.41 | 2.38 | 2.35 | 2.32 |
| | 0.05 | 4.96 | 4.1 | 3.71 | 3.48 | 3.33 | 3.22 | 3.14 | 3.07 | 3.02 | 2.98 |
| | 0.025 | 6.94 | 5.46 | 4.83 | 4.47 | 4.24 | 4.07 | 3.95 | 3.85 | 3.78 | 3.72 |
| | 0.01 | 10 | 7.56 | 6.55 | 5.99 | 5.64 | 5.39 | 5.2 | 5.06 | 4.94 | 4.85 |
| 10 | 0.005 | 12.8 | 9.43 | 8.08 | 7.34 | 6.87 | 6.54 | 6.3 | 6.12 | 5.97 | 5.85 |
| | 0.001 | 21 | 14.9 | 12.6 | 11.3 | 10.5 | 9.93 | 9.52 | 9.2 | 8.96 | 8.75 |

Table A7, continued. F-distribution

| ν_2 , denom. d.f. | α | ν_1 , numerator degrees of freedom | | | | | | | | | |
|-----------------------------|----------|--|--------|--------|--------|--------|--------|--------|--------|--------|----------|
| | | 15 | 20 | 25 | 30 | 40 | 50 | 100 | 200 | 500 | ∞ |
| 1 | 0.25 | 9.49 | 9.58 | 9.63 | 9.67 | 9.71 | 9.74 | 9.8 | 9.82 | 9.84 | 9.85 |
| | 0.1 | 61.2 | 61.7 | 62.1 | 62.3 | 62.5 | 62.7 | 63 | 63.2 | 63.3 | 63.3 |
| | 0.05 | 246 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 254 | 254 |
| | 0.025 | 985 | 993 | 998 | 1001 | 1006 | 1008 | 1013 | 1016 | 1017 | 1018 |
| | 0.01 | 6157 | 6209 | 6240 | 6261 | 6287 | 6303 | 6334 | 6350 | 6360 | 6366 |
| | 0.005 | 24630 | 24836 | 24960 | 25044 | 25148 | 25211 | 25337 | 25401 | 25439 | 25464 |
| | 0.001 | 615764 | 620908 | 624017 | 626099 | 628712 | 630285 | 633444 | 635030 | 635983 | 636619 |
| 2 | 0.25 | 3.41 | 3.43 | 3.44 | 3.44 | 3.45 | 3.46 | 3.47 | 3.47 | 3.47 | 3.48 |
| | 0.1 | 9.42 | 9.44 | 9.45 | 9.46 | 9.47 | 9.47 | 9.48 | 9.49 | 9.49 | 9.49 |
| | 0.05 | 19.4 | 19.4 | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 |
| | 0.025 | 39.4 | 39.4 | 39.5 | 39.5 | 39.5 | 39.5 | 39.5 | 39.5 | 39.5 | 39.5 |
| | 0.01 | 99.4 | 99.4 | 99.5 | 99.5 | 99.5 | 99.5 | 99.5 | 99.5 | 99.5 | 99.5 |
| | 0.005 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 | 199 |
| | 0.001 | 999 | 999 | 999 | 999 | 999 | 999 | 999 | 999 | 999 | 999 |
| 3 | 0.25 | 2.46 | 2.46 | 2.46 | 2.47 | 2.47 | 2.47 | 2.47 | 2.47 | 2.47 | 2.47 |
| | 0.1 | 5.2 | 5.18 | 5.17 | 5.17 | 5.16 | 5.15 | 5.14 | 5.14 | 5.14 | 5.13 |
| | 0.05 | 8.7 | 8.66 | 8.63 | 8.62 | 8.59 | 8.58 | 8.55 | 8.54 | 8.53 | 8.53 |
| | 0.025 | 14.3 | 14.2 | 14.1 | 14.1 | 14 | 14 | 14 | 13.9 | 13.9 | 13.9 |
| | 0.01 | 26.9 | 26.7 | 26.6 | 26.5 | 26.4 | 26.4 | 26.2 | 26.2 | 26.1 | 26.1 |
| | 0.005 | 43.1 | 42.8 | 42.6 | 42.5 | 42.3 | 42.2 | 42 | 41.9 | 41.9 | 41.8 |
| | 0.001 | 127 | 126 | 126 | 125 | 125 | 125 | 124 | 124 | 124 | 123 |
| 4 | 0.25 | 2.08 | 2.08 | 2.08 | 2.08 | 2.08 | 2.08 | 2.08 | 2.08 | 2.08 | 2.08 |
| | 0.1 | 3.87 | 3.84 | 3.83 | 3.82 | 3.8 | 3.8 | 3.78 | 3.77 | 3.76 | 3.76 |
| | 0.05 | 5.86 | 5.8 | 5.77 | 5.75 | 5.72 | 5.7 | 5.66 | 5.65 | 5.64 | 5.63 |
| | 0.025 | 8.66 | 8.56 | 8.5 | 8.46 | 8.41 | 8.38 | 8.32 | 8.29 | 8.27 | 8.26 |
| | 0.01 | 14.2 | 14 | 13.9 | 13.8 | 13.7 | 13.7 | 13.6 | 13.5 | 13.5 | 13.5 |
| | 0.005 | 20.4 | 20.2 | 20 | 19.9 | 19.8 | 19.7 | 19.5 | 19.4 | 19.4 | 19.3 |
| | 0.001 | 46.8 | 46.1 | 45.7 | 45.4 | 45.1 | 44.9 | 44.5 | 44.3 | 44.1 | 44.1 |
| 5 | 0.25 | 1.89 | 1.88 | 1.88 | 1.88 | 1.88 | 1.88 | 1.87 | 1.87 | 1.87 | 1.87 |
| | 0.1 | 3.24 | 3.21 | 3.19 | 3.17 | 3.16 | 3.15 | 3.13 | 3.12 | 3.11 | 3.1 |
| | 0.05 | 4.62 | 4.56 | 4.52 | 4.5 | 4.46 | 4.44 | 4.41 | 4.39 | 4.37 | 4.36 |
| | 0.025 | 6.43 | 6.33 | 6.27 | 6.23 | 6.18 | 6.14 | 6.08 | 6.05 | 6.03 | 6.02 |
| | 0.01 | 9.72 | 9.55 | 9.45 | 9.38 | 9.29 | 9.24 | 9.13 | 9.08 | 9.04 | 9.02 |
| | 0.005 | 13.1 | 12.9 | 12.8 | 12.7 | 12.5 | 12.5 | 12.3 | 12.2 | 12.2 | 12.1 |
| | 0.001 | 25.9 | 25.4 | 25.1 | 24.9 | 24.6 | 24.4 | 24.1 | 24 | 23.9 | 23.8 |
| 6 | 0.25 | 1.76 | 1.76 | 1.75 | 1.75 | 1.75 | 1.75 | 1.74 | 1.74 | 1.74 | 1.74 |
| | 0.1 | 2.87 | 2.84 | 2.81 | 2.8 | 2.78 | 2.77 | 2.75 | 2.73 | 2.73 | 2.72 |
| | 0.05 | 3.94 | 3.87 | 3.83 | 3.81 | 3.77 | 3.75 | 3.71 | 3.69 | 3.68 | 3.67 |
| | 0.025 | 5.27 | 5.17 | 5.11 | 5.07 | 5.01 | 4.98 | 4.92 | 4.88 | 4.86 | 4.85 |
| | 0.01 | 7.56 | 7.4 | 7.3 | 7.23 | 7.14 | 7.09 | 6.99 | 6.93 | 6.9 | 6.88 |
| | 0.005 | 9.81 | 9.59 | 9.45 | 9.36 | 9.24 | 9.17 | 9.03 | 8.95 | 8.91 | 8.88 |
| | 0.001 | 17.6 | 17.1 | 16.9 | 16.7 | 16.4 | 16.3 | 16 | 15.9 | 15.8 | 15.7 |
| 8 | 0.25 | 1.62 | 1.61 | 1.6 | 1.6 | 1.59 | 1.59 | 1.58 | 1.58 | 1.58 | 1.58 |
| | 0.1 | 2.46 | 2.42 | 2.4 | 2.38 | 2.36 | 2.35 | 2.32 | 2.31 | 2.3 | 2.29 |
| | 0.05 | 3.22 | 3.15 | 3.11 | 3.08 | 3.04 | 3.02 | 2.97 | 2.95 | 2.94 | 2.93 |
| | 0.025 | 4.1 | 4 | 3.94 | 3.89 | 3.84 | 3.81 | 3.74 | 3.7 | 3.68 | 3.67 |
| | 0.01 | 5.52 | 5.36 | 5.26 | 5.2 | 5.12 | 5.07 | 4.96 | 4.91 | 4.88 | 4.86 |
| | 0.005 | 6.81 | 6.61 | 6.48 | 6.4 | 6.29 | 6.22 | 6.09 | 6.02 | 5.98 | 5.95 |
| | 0.001 | 10.8 | 10.5 | 10.3 | 10.1 | 9.92 | 9.8 | 9.57 | 9.45 | 9.38 | 9.33 |
| 10 | 0.25 | 1.53 | 1.52 | 1.52 | 1.51 | 1.51 | 1.5 | 1.49 | 1.49 | 1.49 | 1.48 |
| | 0.1 | 2.24 | 2.2 | 2.17 | 2.16 | 2.13 | 2.12 | 2.09 | 2.07 | 2.06 | 2.06 |
| | 0.05 | 2.85 | 2.77 | 2.73 | 2.7 | 2.66 | 2.64 | 2.59 | 2.56 | 2.55 | 2.54 |
| | 0.025 | 3.52 | 3.42 | 3.35 | 3.31 | 3.26 | 3.22 | 3.15 | 3.12 | 3.09 | 3.08 |
| | 0.01 | 4.56 | 4.41 | 4.31 | 4.25 | 4.17 | 4.12 | 4.01 | 3.96 | 3.93 | 3.91 |
| | 0.005 | 5.47 | 5.27 | 5.15 | 5.07 | 4.97 | 4.9 | 4.77 | 4.71 | 4.67 | 4.64 |
| | 0.001 | 8.13 | 7.8 | 7.6 | 7.47 | 7.3 | 7.19 | 6.98 | 6.87 | 6.81 | 6.76 |

Table A7, continued. F-distribution

| ν_2 , denom. d.f. | α | ν_1 , numerator degrees of freedom | | | | | | | | | |
|-----------------------------|----------|--|------|------|------|------|------|------|------|------|------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 15 | 0.25 | 1.43 | 1.52 | 1.52 | 1.51 | 1.49 | 1.48 | 1.47 | 1.46 | 1.46 | 1.45 |
| | 0.1 | 3.07 | 2.7 | 2.49 | 2.36 | 2.27 | 2.21 | 2.16 | 2.12 | 2.09 | 2.06 |
| | 0.05 | 4.54 | 3.68 | 3.29 | 3.06 | 2.9 | 2.79 | 2.71 | 2.64 | 2.59 | 2.54 |
| | 0.025 | 6.2 | 4.77 | 4.15 | 3.8 | 3.58 | 3.41 | 3.29 | 3.2 | 3.12 | 3.06 |
| | 0.01 | 8.68 | 6.36 | 5.42 | 4.89 | 4.56 | 4.32 | 4.14 | 4 | 3.89 | 3.8 |
| | 0.005 | 10.8 | 7.7 | 6.48 | 5.8 | 5.37 | 5.07 | 4.85 | 4.67 | 4.54 | 4.42 |
| | 0.001 | 16.6 | 11.3 | 9.34 | 8.25 | 7.57 | 7.09 | 6.74 | 6.47 | 6.26 | 6.08 |
| 20 | 0.25 | 1.4 | 1.49 | 1.48 | 1.47 | 1.45 | 1.44 | 1.43 | 1.42 | 1.41 | 1.4 |
| | 0.1 | 2.97 | 2.59 | 2.38 | 2.25 | 2.16 | 2.09 | 2.04 | 2 | 1.96 | 1.94 |
| | 0.05 | 4.35 | 3.49 | 3.1 | 2.87 | 2.71 | 2.6 | 2.51 | 2.45 | 2.39 | 2.35 |
| | 0.025 | 5.87 | 4.46 | 3.86 | 3.51 | 3.29 | 3.13 | 3.01 | 2.91 | 2.84 | 2.77 |
| | 0.01 | 8.1 | 5.85 | 4.94 | 4.43 | 4.1 | 3.87 | 3.7 | 3.56 | 3.46 | 3.37 |
| | 0.005 | 9.94 | 6.99 | 5.82 | 5.17 | 4.76 | 4.47 | 4.26 | 4.09 | 3.96 | 3.85 |
| | 0.001 | 14.8 | 9.95 | 8.1 | 7.1 | 6.46 | 6.02 | 5.69 | 5.44 | 5.24 | 5.08 |
| 25 | 0.25 | 1.39 | 1.47 | 1.46 | 1.44 | 1.42 | 1.41 | 1.4 | 1.39 | 1.38 | 1.37 |
| | 0.1 | 2.92 | 2.53 | 2.32 | 2.18 | 2.09 | 2.02 | 1.97 | 1.93 | 1.89 | 1.87 |
| | 0.05 | 4.24 | 3.39 | 2.99 | 2.76 | 2.6 | 2.49 | 2.4 | 2.34 | 2.28 | 2.24 |
| | 0.025 | 5.69 | 4.29 | 3.69 | 3.35 | 3.13 | 2.97 | 2.85 | 2.75 | 2.68 | 2.61 |
| | 0.01 | 7.77 | 5.57 | 4.68 | 4.18 | 3.85 | 3.63 | 3.46 | 3.32 | 3.22 | 3.13 |
| | 0.005 | 9.48 | 6.6 | 5.46 | 4.84 | 4.43 | 4.15 | 3.94 | 3.78 | 3.64 | 3.54 |
| | 0.001 | 13.9 | 9.22 | 7.45 | 6.49 | 5.89 | 5.46 | 5.15 | 4.91 | 4.71 | 4.56 |
| 30 | 0.25 | 1.38 | 1.45 | 1.44 | 1.42 | 1.41 | 1.39 | 1.38 | 1.37 | 1.36 | 1.35 |
| | 0.1 | 2.88 | 2.49 | 2.28 | 2.14 | 2.05 | 1.98 | 1.93 | 1.88 | 1.85 | 1.82 |
| | 0.05 | 4.17 | 3.32 | 2.92 | 2.69 | 2.53 | 2.42 | 2.33 | 2.27 | 2.21 | 2.16 |
| | 0.025 | 5.57 | 4.18 | 3.59 | 3.25 | 3.03 | 2.87 | 2.75 | 2.65 | 2.57 | 2.51 |
| | 0.01 | 7.56 | 5.39 | 4.51 | 4.02 | 3.7 | 3.47 | 3.3 | 3.17 | 3.07 | 2.98 |
| | 0.005 | 9.18 | 6.35 | 5.24 | 4.62 | 4.23 | 3.95 | 3.74 | 3.58 | 3.45 | 3.34 |
| | 0.001 | 13.3 | 8.77 | 7.05 | 6.12 | 5.53 | 5.12 | 4.82 | 4.58 | 4.39 | 4.24 |
| 40 | 0.25 | 1.36 | 1.44 | 1.42 | 1.4 | 1.39 | 1.37 | 1.36 | 1.35 | 1.34 | 1.33 |
| | 0.1 | 2.84 | 2.44 | 2.23 | 2.09 | 2 | 1.93 | 1.87 | 1.83 | 1.79 | 1.76 |
| | 0.05 | 4.08 | 3.23 | 2.84 | 2.61 | 2.45 | 2.34 | 2.25 | 2.18 | 2.12 | 2.08 |
| | 0.025 | 5.42 | 4.05 | 3.46 | 3.13 | 2.9 | 2.74 | 2.62 | 2.53 | 2.45 | 2.39 |
| | 0.01 | 7.31 | 5.18 | 4.31 | 3.83 | 3.51 | 3.29 | 3.12 | 2.99 | 2.89 | 2.8 |
| | 0.005 | 8.83 | 6.07 | 4.98 | 4.37 | 3.99 | 3.71 | 3.51 | 3.35 | 3.22 | 3.12 |
| | 0.001 | 12.6 | 8.25 | 6.59 | 5.7 | 5.13 | 4.73 | 4.44 | 4.21 | 4.02 | 3.87 |
| 50 | 0.25 | 1.35 | 1.43 | 1.41 | 1.39 | 1.37 | 1.36 | 1.34 | 1.33 | 1.32 | 1.31 |
| | 0.1 | 2.81 | 2.41 | 2.2 | 2.06 | 1.97 | 1.9 | 1.84 | 1.8 | 1.76 | 1.73 |
| | 0.05 | 4.03 | 3.18 | 2.79 | 2.56 | 2.4 | 2.29 | 2.2 | 2.13 | 2.07 | 2.03 |
| | 0.025 | 5.34 | 3.97 | 3.39 | 3.05 | 2.83 | 2.67 | 2.55 | 2.46 | 2.38 | 2.32 |
| | 0.01 | 7.17 | 5.06 | 4.2 | 3.72 | 3.41 | 3.19 | 3.02 | 2.89 | 2.78 | 2.7 |
| | 0.005 | 8.63 | 5.9 | 4.83 | 4.23 | 3.85 | 3.58 | 3.38 | 3.22 | 3.09 | 2.99 |
| | 0.001 | 12.2 | 7.96 | 6.34 | 5.46 | 4.9 | 4.51 | 4.22 | 4 | 3.82 | 3.67 |
| 100 | 0.25 | 1.34 | 1.41 | 1.39 | 1.37 | 1.35 | 1.33 | 1.32 | 1.3 | 1.29 | 1.28 |
| | 0.1 | 2.76 | 2.36 | 2.14 | 2 | 1.91 | 1.83 | 1.78 | 1.73 | 1.69 | 1.66 |
| | 0.05 | 3.94 | 3.09 | 2.7 | 2.46 | 2.31 | 2.19 | 2.1 | 2.03 | 1.97 | 1.93 |
| | 0.025 | 5.18 | 3.83 | 3.25 | 2.92 | 2.7 | 2.54 | 2.42 | 2.32 | 2.24 | 2.18 |
| | 0.01 | 6.9 | 4.82 | 3.98 | 3.51 | 3.21 | 2.99 | 2.82 | 2.69 | 2.59 | 2.5 |
| | 0.005 | 8.24 | 5.59 | 4.54 | 3.96 | 3.59 | 3.33 | 3.13 | 2.97 | 2.85 | 2.74 |
| | 0.001 | 11.5 | 7.41 | 5.86 | 5.02 | 4.48 | 4.11 | 3.83 | 3.61 | 3.44 | 3.3 |
| 200 | 0.25 | 1.33 | 1.4 | 1.38 | 1.36 | 1.34 | 1.32 | 1.3 | 1.29 | 1.28 | 1.27 |
| | 0.1 | 2.73 | 2.33 | 2.11 | 1.97 | 1.88 | 1.8 | 1.75 | 1.7 | 1.66 | 1.63 |
| | 0.05 | 3.89 | 3.04 | 2.65 | 2.42 | 2.26 | 2.14 | 2.06 | 1.98 | 1.93 | 1.88 |
| | 0.025 | 5.1 | 3.76 | 3.18 | 2.85 | 2.63 | 2.47 | 2.35 | 2.26 | 2.18 | 2.11 |
| | 0.01 | 6.76 | 4.71 | 3.88 | 3.41 | 3.11 | 2.89 | 2.73 | 2.6 | 2.5 | 2.41 |
| | 0.005 | 8.06 | 5.44 | 4.41 | 3.84 | 3.47 | 3.21 | 3.01 | 2.86 | 2.73 | 2.63 |
| | 0.001 | 11.2 | 7.15 | 5.63 | 4.81 | 4.29 | 3.92 | 3.65 | 3.43 | 3.26 | 3.12 |
| ∞ | 0.25 | 1.32 | 1.39 | 1.37 | 1.35 | 1.33 | 1.31 | 1.29 | 1.28 | 1.27 | 1.25 |
| | 0.1 | 2.71 | 2.3 | 2.08 | 1.94 | 1.85 | 1.77 | 1.72 | 1.67 | 1.63 | 1.6 |
| | 0.05 | 3.84 | 3 | 2.6 | 2.37 | 2.21 | 2.1 | 2.01 | 1.94 | 1.88 | 1.83 |
| | 0.025 | 5.02 | 3.69 | 3.12 | 2.79 | 2.57 | 2.41 | 2.29 | 2.19 | 2.11 | 2.05 |
| | 0.01 | 6.63 | 4.61 | 3.78 | 3.32 | 3.02 | 2.8 | 2.64 | 2.51 | 2.41 | 2.32 |
| | 0.005 | 7.88 | 5.3 | 4.28 | 3.72 | 3.35 | 3.09 | 2.9 | 2.74 | 2.62 | 2.52 |
| | 0.001 | 10.8 | 6.91 | 5.42 | 4.62 | 4.1 | 3.74 | 3.47 | 3.27 | 3.1 | 2.96 |

Table A7, continued. F-distribution

| ν_2 , denom. d.f. | α | ν_1 , numerator degrees of freedom | | | | | | | | | |
|-----------------------------|----------|--|------|------|------|------|------|------|------|------|-----------|
| | | 15 | 20 | 25 | 30 | 40 | 50 | 100 | 200 | 500 | ∞ |
| 15 | 0.25 | 1.43 | 1.41 | 1.4 | 1.4 | 1.39 | 1.38 | 1.37 | 1.37 | 1.36 | 1.36 |
| | 0.1 | 1.97 | 1.92 | 1.89 | 1.87 | 1.85 | 1.83 | 1.79 | 1.77 | 1.76 | 1.76 |
| | 0.05 | 2.4 | 2.33 | 2.28 | 2.25 | 2.2 | 2.18 | 2.12 | 2.1 | 2.08 | 2.07 |
| | 0.025 | 2.86 | 2.76 | 2.69 | 2.64 | 2.59 | 2.55 | 2.47 | 2.44 | 2.41 | 2.4 |
| | 0.01 | 3.52 | 3.37 | 3.28 | 3.21 | 3.13 | 3.08 | 2.98 | 2.92 | 2.89 | 2.87 |
| | 0.005 | 4.07 | 3.88 | 3.77 | 3.69 | 3.58 | 3.52 | 3.39 | 3.33 | 3.29 | 3.26 |
| | 0.001 | 5.54 | 5.25 | 5.07 | 4.95 | 4.8 | 4.7 | 4.51 | 4.41 | 4.35 | 4.31 |
| 20 | 0.25 | 1.37 | 1.36 | 1.35 | 1.34 | 1.33 | 1.32 | 1.31 | 1.3 | 1.3 | 1.29 |
| | 0.1 | 1.84 | 1.79 | 1.76 | 1.74 | 1.71 | 1.69 | 1.65 | 1.63 | 1.62 | 1.61 |
| | 0.05 | 2.2 | 2.12 | 2.07 | 2.04 | 1.99 | 1.97 | 1.91 | 1.88 | 1.86 | 1.84 |
| | 0.025 | 2.57 | 2.46 | 2.4 | 2.35 | 2.29 | 2.25 | 2.17 | 2.13 | 2.11 | 2.09 |
| | 0.01 | 3.09 | 2.94 | 2.84 | 2.78 | 2.69 | 2.64 | 2.54 | 2.48 | 2.44 | 2.42 |
| | 0.005 | 3.5 | 3.32 | 3.2 | 3.12 | 3.02 | 2.96 | 2.83 | 2.76 | 2.72 | 2.69 |
| | 0.001 | 4.56 | 4.29 | 4.12 | 4 | 3.86 | 3.77 | 3.58 | 3.48 | 3.42 | 3.38 |
| 25 | 0.25 | 1.34 | 1.33 | 1.31 | 1.31 | 1.29 | 1.29 | 1.27 | 1.26 | 1.26 | 1.25 |
| | 0.1 | 1.77 | 1.72 | 1.68 | 1.66 | 1.63 | 1.61 | 1.56 | 1.54 | 1.53 | 1.52 |
| | 0.05 | 2.09 | 2.01 | 1.96 | 1.92 | 1.87 | 1.84 | 1.78 | 1.75 | 1.73 | 1.71 |
| | 0.025 | 2.41 | 2.3 | 2.23 | 2.18 | 2.12 | 2.08 | 2 | 1.95 | 1.92 | 1.91 |
| | 0.01 | 2.85 | 2.7 | 2.6 | 2.54 | 2.45 | 2.4 | 2.29 | 2.23 | 2.19 | 2.17 |
| | 0.005 | 3.2 | 3.01 | 2.9 | 2.82 | 2.72 | 2.65 | 2.52 | 2.45 | 2.41 | 2.38 |
| | 0.001 | 4.06 | 3.79 | 3.63 | 3.52 | 3.37 | 3.28 | 3.09 | 2.99 | 2.93 | 2.89 |
| 30 | 0.25 | 1.32 | 1.3 | 1.29 | 1.28 | 1.27 | 1.26 | 1.25 | 1.24 | 1.23 | 1.23 |
| | 0.1 | 1.72 | 1.67 | 1.63 | 1.61 | 1.57 | 1.55 | 1.51 | 1.48 | 1.47 | 1.46 |
| | 0.05 | 2.01 | 1.93 | 1.88 | 1.84 | 1.79 | 1.76 | 1.7 | 1.66 | 1.64 | 1.62 |
| | 0.025 | 2.31 | 2.2 | 2.12 | 2.07 | 2.01 | 1.97 | 1.88 | 1.84 | 1.81 | 1.79 |
| | 0.01 | 2.7 | 2.55 | 2.45 | 2.39 | 2.3 | 2.25 | 2.13 | 2.07 | 2.03 | 2.01 |
| | 0.005 | 3.01 | 2.82 | 2.71 | 2.63 | 2.52 | 2.46 | 2.32 | 2.25 | 2.21 | 2.18 |
| | 0.001 | 3.75 | 3.49 | 3.33 | 3.22 | 3.07 | 2.98 | 2.79 | 2.69 | 2.63 | 2.59 |
| 40 | 0.25 | 1.3 | 1.28 | 1.26 | 1.25 | 1.24 | 1.23 | 1.21 | 1.2 | 1.19 | 1.19 |
| | 0.1 | 1.66 | 1.61 | 1.57 | 1.54 | 1.51 | 1.48 | 1.43 | 1.41 | 1.39 | 1.38 |
| | 0.05 | 1.92 | 1.84 | 1.78 | 1.74 | 1.69 | 1.66 | 1.59 | 1.55 | 1.53 | 1.51 |
| | 0.025 | 2.18 | 2.07 | 1.99 | 1.94 | 1.88 | 1.83 | 1.74 | 1.69 | 1.66 | 1.64 |
| | 0.01 | 2.52 | 2.37 | 2.27 | 2.2 | 2.11 | 2.06 | 1.94 | 1.87 | 1.83 | 1.8 |
| | 0.005 | 2.78 | 2.6 | 2.48 | 2.4 | 2.3 | 2.23 | 2.09 | 2.01 | 1.96 | 1.93 |
| | 0.001 | 3.4 | 3.14 | 2.98 | 2.87 | 2.73 | 2.64 | 2.44 | 2.34 | 2.28 | 2.23 |
| 50 | 0.25 | 1.28 | 1.26 | 1.25 | 1.23 | 1.22 | 1.21 | 1.19 | 1.18 | 1.17 | 1.16 |
| | 0.1 | 1.63 | 1.57 | 1.53 | 1.5 | 1.46 | 1.44 | 1.39 | 1.36 | 1.34 | 1.33 |
| | 0.05 | 1.87 | 1.78 | 1.73 | 1.69 | 1.63 | 1.6 | 1.52 | 1.48 | 1.46 | 1.44 |
| | 0.025 | 2.11 | 1.99 | 1.92 | 1.87 | 1.8 | 1.75 | 1.66 | 1.6 | 1.57 | 1.55 |
| | 0.01 | 2.42 | 2.27 | 2.17 | 2.1 | 2.01 | 1.95 | 1.82 | 1.76 | 1.71 | 1.68 |
| | 0.005 | 2.65 | 2.47 | 2.35 | 2.27 | 2.16 | 2.1 | 1.95 | 1.87 | 1.82 | 1.79 |
| | 0.001 | 3.2 | 2.95 | 2.79 | 2.68 | 2.53 | 2.44 | 2.25 | 2.14 | 2.07 | 2.03 |
| 100 | 0.25 | 1.25 | 1.23 | 1.21 | 1.2 | 1.18 | 1.17 | 1.14 | 1.13 | 1.12 | 1.11 |
| | 0.1 | 1.56 | 1.49 | 1.45 | 1.42 | 1.38 | 1.35 | 1.29 | 1.26 | 1.23 | 1.21 |
| | 0.05 | 1.77 | 1.68 | 1.62 | 1.57 | 1.52 | 1.48 | 1.39 | 1.34 | 1.31 | 1.28 |
| | 0.025 | 1.97 | 1.85 | 1.77 | 1.71 | 1.64 | 1.59 | 1.48 | 1.42 | 1.38 | 1.35 |
| | 0.01 | 2.22 | 2.07 | 1.97 | 1.89 | 1.8 | 1.74 | 1.6 | 1.52 | 1.47 | 1.43 |
| | 0.005 | 2.41 | 2.23 | 2.11 | 2.02 | 1.91 | 1.84 | 1.68 | 1.59 | 1.53 | 1.49 |
| | 0.001 | 2.84 | 2.59 | 2.43 | 2.32 | 2.17 | 2.08 | 1.87 | 1.75 | 1.67 | 1.62 |
| 200 | 0.25 | 1.23 | 1.21 | 1.19 | 1.18 | 1.16 | 1.15 | 1.12 | 1.1 | 1.09 | 1.07 |
| | 0.1 | 1.52 | 1.46 | 1.41 | 1.38 | 1.34 | 1.31 | 1.24 | 1.2 | 1.17 | 1.14 |
| | 0.05 | 1.72 | 1.62 | 1.56 | 1.52 | 1.46 | 1.41 | 1.32 | 1.26 | 1.22 | 1.19 |
| | 0.025 | 1.9 | 1.78 | 1.7 | 1.64 | 1.56 | 1.51 | 1.39 | 1.32 | 1.27 | 1.23 |
| | 0.01 | 2.13 | 1.97 | 1.87 | 1.79 | 1.69 | 1.63 | 1.48 | 1.39 | 1.33 | 1.28 |
| | 0.005 | 2.3 | 2.11 | 1.99 | 1.91 | 1.79 | 1.71 | 1.54 | 1.44 | 1.37 | 1.31 |
| | 0.001 | 2.67 | 2.42 | 2.26 | 2.15 | 2 | 1.9 | 1.68 | 1.55 | 1.46 | 1.39 |
| ∞ | 0.25 | 1.22 | 1.19 | 1.17 | 1.16 | 1.14 | 1.13 | 1.09 | 1.07 | 1.04 | Undefined |
| | 0.1 | 1.49 | 1.42 | 1.38 | 1.34 | 1.3 | 1.26 | 1.18 | 1.13 | 1.08 | |
| | 0.05 | 1.67 | 1.57 | 1.51 | 1.46 | 1.39 | 1.35 | 1.24 | 1.17 | 1.11 | |
| | 0.025 | 1.83 | 1.71 | 1.63 | 1.57 | 1.48 | 1.43 | 1.3 | 1.21 | 1.13 | |
| | 0.01 | 2.04 | 1.88 | 1.77 | 1.7 | 1.59 | 1.52 | 1.36 | 1.25 | 1.15 | |
| | 0.005 | 2.19 | 2 | 1.88 | 1.79 | 1.67 | 1.59 | 1.4 | 1.28 | 1.17 | |
| | 0.001 | 2.51 | 2.27 | 2.1 | 1.99 | 1.84 | 1.73 | 1.49 | 1.34 | 1.21 | |