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> #This script was used to do the problems on
> #   a particular worksheet12
> ##################
> ## C A S E:  1  ##
> ##################
> n_1 <- 26       # set the sample size for the numerator
> s_1 <- 12.48     # Standard deviation of sample for numerator
> n_2 <- 38       # set the sample size for the denominator
> s_2 <- 11.25    # Standard deviation of sample for denominator
> ci_level <- 0.88  # set the confidence level
> #
> # We could do this the long way
> #
> df_num <- n_1 - 1;
> df_den <- n_2 - 1;
> c(df_num,df_den);
[1] 25 37
> #
> alpha <- (1-ci_level)/2 # desired area on left and right
> alpha
[1] 0.06
> quotient =s_1^2/(s_2^2)  # get the quotient of the variances
> quotient
[1] 1.23062
> #
> f_left <- qf( alpha, df_num, df_den)
> f_left
[1] 0.549991
> f_right <- qf( alpha, df_num, df_den, lower.tail=FALSE)
> f_right
[1] 1.74825
> #
> ci_left <- quotient/f_right
> ci_right <- quotient/f_left
> ci_left
[1] 0.7039155
> ci_right
[1] 2.237528
> #
> # or we could do this the simple way
> #
> source("../ci_2popvar.R")
> ci_2popvar(n_1,s_1, n_2, s_2, ci_level )
      CI Low     CI_HIGH    Quotient       F Low      F High
   0.7039155   2.2375283   1.2306204   0.5499910   1.7482503
    Top Var.      Top sd    Top size    Bot Var.      Bot sd
155.7504000  12.4800000  26.0000000 126.5625000  11.2500000
    Bot size     C level     Alpha/2
 38.0000000   0.8800000   0.0600000
> #
> ##################
> ## C A S E:  2  ##
> ##################
> n_1 <- 41       # set the sample size for the numerator
> s_1 <- 24.06     # Standard deviation of sample for numerator
> n_2 <- 34       # set the sample size for the denominator
> s_2 <- 22.53    # Standard deviation of sample for denominator
> ci_level <- 0.85  # set the confidence level
> #
> ci_2popvar(n_1,s_1, n_2, s_2, ci_level )
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      CI Low     CI_HIGH    Quotient       F Low      F High
   0.6974092   1.8376632   1.1404306   0.6205874   1.6352388
    Top Var.      Top sd    Top size    Bot Var.      Bot sd
578.8836000  24.0600000  41.0000000 507.6009000  22.5300000
    Bot size     C level     Alpha/2
 34.0000000   0.8500000   0.0750000
> #
> ##################
> ## C A S E:  3  ##
> ##################
> n_1 <- 23       # set the sample size for the numerator
> s_1 <- 45.39     # Standard deviation of sample for numerator
> n_2 <- 45       # set the sample size for the denominator
> s_2 <- 42.98    # Standard deviation of sample for denominator
> ci_level <- 0.985  # set the confidence level
> #
> ci_2popvar(n_1,s_1, n_2, s_2, ci_level )
       CI Low      CI_HIGH     Quotient        F Low
    0.4716906    2.9878621    1.1152893    0.3732734
       F High     Top Var.       Top sd     Top size
    2.3644511 2060.2521000   45.3900000   23.0000000
     Bot Var.       Bot sd     Bot size      C level
1847.2804000   42.9800000   45.0000000    0.9850000
      Alpha/2
    0.0075000
> #
> ##################
> ## C A S E:  4  ##
> ##################
> n_1 <- 27       # set the sample size for the numerator
> s_1 <- 16.32     # Standard deviation of sample for numerator
> n_2 <- 31       # set the sample size for the denominator
> s_2 <- 9.931    # Standard deviation of sample for denominator
> alpha <- 0.01   # set the level of significance
> h_type <- 1     # set the type of the test
> #
> # we can do this the long way
> df_n <- n_1 - 1
> df_d <- n_2 - 1
> c(df_n,df_d)
[1] 26 30
> v_1 <- s_1^2      # get the variance of the first sample
> v_1
[1] 266.3424
> v_2 <- s_2^2      # get the variance of the second sample
> v_2
[1] 98.62476
> quotient <- v_1/v_2  # get the ratio
> quotient
[1] 2.700563
> use_alpha <- alpha
> if( h_type == 0 )
+ { use_alpha <- alpha/2}
> # find the critical F values
> F_left <- qf( use_alpha, df_n, df_d)
> F_right <- qf( use_alpha, df_n, df_d, lower.tail=FALSE)
> F_left
[1] 0.3995806
> F_right
[1] 2.437425
```

```
> # or look at the attained significance
> if( h_type == -1 )
+   { pf( quotient, df_n, df_d ) } #area to left
> if (h_type == 1)
+ { pf( quotient, df_n, df_d, lower.tail=FALSE) } #are to right
[1] 0.004851294
> if( h_type == 0)
+ { # this is a type 0
+   if( quotient <  1)
+   { pf( quotient, df_n, df_d )*2} # need to double for two tails
+   else
+   { # need to double to account for the two tails
+     pf( quotient, df_n, df_d, lower.tail=FALSE)*2
+   }
+ }
>
> #or we can use the simple approach
> source("../hypo_2var.R")
> hypoth_2test_var(n_1,s_1, n_2, s_2, h_type, alpha )
                   H1                 n top
         "v_1 > v_2"                  "27"
               s top                v top
             "16.32"            "266.3424"
               n bot                s bot
                "31"               "9.931"
               v bot              quotient
         "98.624761"   "2.70056319832299"
            crit low            crit high
              "n.a."   "2.43742466762021"
            decision             attained
            "Reject" "0.0048512944386742"
> #
> ##################
> ## C A S E:  5  ##
> ##################
> n_1 <- 53       # set the sample size for the numerator
> s_1 <- 23.81     # Standard deviation of sample for numerator
> n_2 <- 30       # set the sample size for the denominator
> s_2 <- 31.615    # Standard deviation of sample for denominator
> alpha <- 0.0175   # set the level of significance
> h_type <- -1     # set the type of the test
> #
> # we can use the simple approach
> #
> hypoth_2test_var(n_1,s_1, n_2, s_2, h_type, alpha )
                   H1                 n top
         "v_1 < v_2"                  "53"
               s top                v top
             "23.81"            "566.9161"
               n bot                s bot
                "30"              "31.615"
               v bot              quotient
        "999.508225"  "0.567195032337028"
            crit low            crit high
 "0.511888022934923"               "n.a."
            decision             attained
     "do not reject" "0.0370508047263761"
> #
> ##################
> ## C A S E:  6  ##
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> ##################
> n_1 <- 23       # set the sample size for the numerator
> s_1 <- 13.90     # Standard deviation of sample for numerator
> n_2 <- 32       # set the sample size for the denominator
> s_2 <- 9.865   # Standard deviation of sample for denominator
> alpha <- 0.0625   # set the level of significance
> h_type <- 0     # set the type of the test
> #
> # we can use the simple approach
> #
> hypoth_2test_var(n_1,s_1, n_2, s_2, h_type, alpha )
                   H1                 n top
        "v_1 != v_2"                  "23"
               s top                 v top
              "13.9"              "193.21"
               n bot                 s bot
                "32"               "9.865"
               v bot              quotient
         "97.318225"   "1.98534241659258"
            crit low           crit high
 "0.460588173823856"   "2.06550024142697"
            decision              attained
     "do not reject" "0.0780088982401659"
> #
> ##################
> ## C A S E:  7  ##
> ##################
> n_1 <- 17       # set the sample size for the numerator
> s_1 <- 20.05     # Standard deviation of sample for numerator
> n_2 <- 22       # set the sample size for the denominator
> s_2 <- 13.179    # Standard deviation of sample for denominator
> alpha <- 0.0875   # set the level of significance
> h_type <- 0     # set the type of the test
> #
> # we can use the simple approach
> #
> hypoth_2test_var(n_1,s_1, n_2, s_2, h_type, alpha )
                   H1                 n top
        "v_1 != v_2"                  "17"
               s top                 v top
             "20.05"           "402.0025"
               n bot                 s bot
                "22"              "13.179"
               v bot              quotient
        "173.686041"   "2.31453545538527"
            crit low           crit high
 "0.427417605839476"   "2.22295877782628"
            decision              attained
            "Reject" "0.0729347789694876"
> #
> ##################
> ## C A S E:  8  ##
> ##################
> n_1 <- 22       # set the sample size for the numerator
> s_1 <- 13.179     # Standard deviation of sample for numerator
> n_2 <- 17       # set the sample size for the denominator
> s_2 <- 8.444    # Standard deviation of sample for denominator
> alpha <- 0.0875   # set the level of significance
> h_type <- 0     # set the type of the test
> #
```

```
> # we can use the simple approach
> #
> hypoth_2test_var(n_1,s_1, n_2, s_2, h_type, alpha )
                   H1                 n top
         "v_1 != v_2"                  "22"
                s top                 v top
            "13.179"          "173.686041"
                n bot                 s bot
                 "17"               "8.444"
                v bot              quotient
          "71.301136"   "2.43595054362107"
             crit low            crit high
 "0.449850896910401"   "2.33963221528026"
             decision              attained
             "Reject" "0.0739325582328809"
>
```