

# Igor Technical Notes

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WaveMetrics Technical Support

## #005: Statistical x-tests

Written by:  
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Staff May

This Technical Note and accompanying experiment provide macros for performing Student's t-test and the F-test.

### Accompanying files:

'x-tests' -- sample experiment  
'x-tests TEXT' -- text file containing macros ttest(),  
tutest(), tptest() & ftest().

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The macros provided here are used to help decide if two distributions have the same means or variances. They also illustrate how to return results from macros.

These routines were translated from the C code in section 13.4 of Numerical Recipes in C. Please refer to this section for documentation. In particular, compare the C code to Igor to see how such translations are done.

Here is one of the macros:

| Given the arrays w1 and w2, this routine returns Student's t as U\_t  
| and its significance as U\_prob. See Numerical Recipes section 13.4  
| for more info.

```
Macro ttest(w1,w2)
  string w1,w2
  Prompt w1,"array 1",popup WaveList("*",";","")
  Prompt w2,"array 2",popup WaveList("*",";","")
;
  Silent 1
  WaveStats/Q $w1
  Variable ave1=V_avg, var1= V_sdev^2, n1= V_npnts
  WaveStats/Q $w2
  Variable ave2=V_avg, var2= V_sdev^2, n2= V_npnts
  Variable df= n1+n2-2 | Degrees of freedom
  Variable svar= ((n1-1)*var1+(n2-1)*var2)/df | Pooled variance
```

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```
Variable/G U_t= (ave1-ave2)/sqrt(svar*(1/n1 + 1/n2))  
Variable/G U_prob= betai(0.5*df,0.5,df/(df+U_t^2))
```

End

Notice that the results are returned as global variables with a special prefix. By using this prefix you can be sure you will not conflict with present or future Igor-defined global variables. See TN008 for more discussion.

**Further Reference:**

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- Technical Note #008, Returning results from macros
- Press W.H. et al, Numerical Recipes in C, Cambridge, 1988
- Bevington, P.R., Data Reduction and Error Analysis for the Physical Sciences, McGraw-Hill, 1969