Effect of Inter-Item r and Number of Items on Reliability

```
*Inter-Item r = .20.
CORR v1 v2 /MISS = LIST.
```

Correlations

	v1
v2	.196

```
SAMPLE 48 FROM 20000.
RELIAB /VARI = v1 TO v2.
```

Cronbach's Alpha	N of Items
.326	2

```
RELIAB /VARI = v1 to v4.
```

Cronbach's Alpha	N of Items
.425	4

```
RELIAB /VARI = v1 to v8.
```

Cronbach's Alpha	N of Items
.693	8

```
RELIAB /VARI = v1 to v16.
```

Cronbach's Alpha	N of Items
.767	16

```
*Inter-Item r = .30.
CORR v1 v2 /MISS = LIST.
```

	v1
v2	.296
	.000

```
SAMPLE 48 FROM 20000.
RELIAB /VARI = v1 to v2.
```

Cronbach's Alpha	N of Items
.468	2

```
RELIAB /VARI = v1 to v4.
```

Cronbach's Alpha	N of Items
.580	4

```
RELIAB /VARI = v1 to v8.
```

Cronbach's Alpha	N of Items
.785	8

```
RELIAB /VARI = v1 to v16.
```

Cronbach's Alpha	N of Items
.850	16

```
*Inter-Item r = .60.
CORR v1 v2 /MISS = LIST.
```

	v1
v2	.597
	.000

```
SAMPLE 96 FROM 20000.
RELIAB /VARI = v1 to v2.
```

Cronbach's Alpha	N of Items
.769	2

```
RELIAB /VARI = v1 to v4.
```

Cronbach's Alpha	N of Items
.865	4

```
RELIAB /VARI = v1 to v8.
```

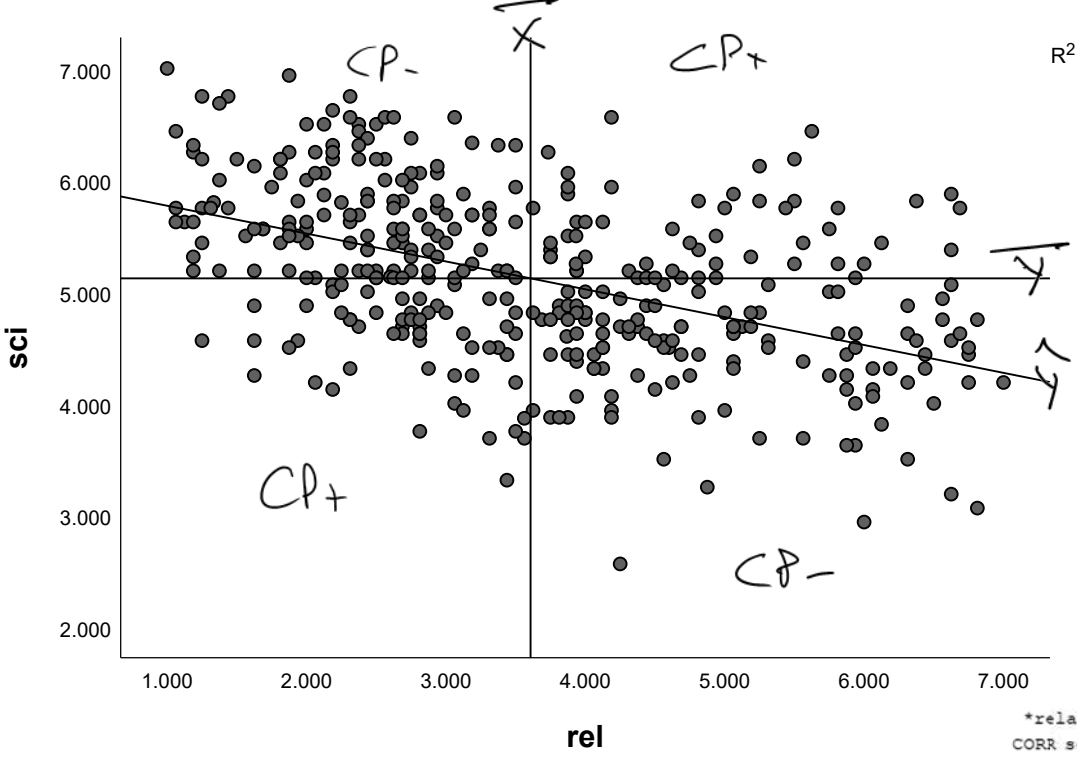
Cronbach's Alpha	N of Items
.927	8

```
RELIAB /VARI = v1 to v16.
```

Cronbach's Alpha	N of Items
.958	16

Unit 1 Analyses on Religion & Science Survey Data

```
GRAPH  /SCATTERPLOT(BIVAR)=rel WITH sci.
```




```
REGRESS /DEP = sci /ENTER rel /SAVE PRED(prds.r) RESI(ress.r).
```

Model	R	R Square
1	.474	.225

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51.469	1	51.469	110.101	.000
	Residual	177.173	379	.467		
	Total	228.643	380			

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	6.020	.093		64.985	.000
	rel	-.249	.024	-.474	-10.493	.000

Residuals Statistics

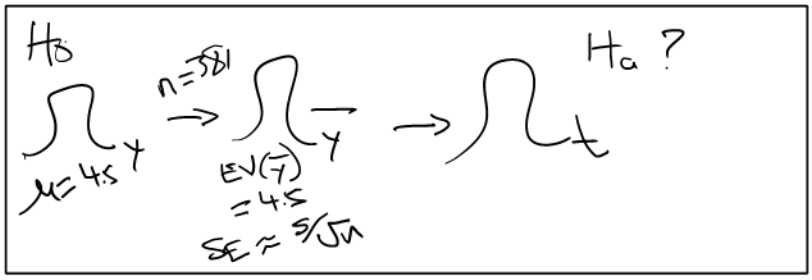
	Mean	Std. Deviation	N
Predicted Value	5.12012	.368030	381
Residual	.000000	.682822	381

```
*relationship between sci and rel.
CORR sci rel /STAT.
```

	Mean	Std. Deviation	N
sci	5.12012	.776688	381
rel	3.60728	1.475327	381

Correlations

	sci
rel	-.474
	.000
	381



How do I get ΣY & SS from raw data?

$\bar{Y} = \frac{\Sigma Y}{n}$ $SS = \Sigma(Y-\bar{Y})^2$

$s^2 = \frac{SS}{n-1}$

$s = \sqrt{s^2}$

```
*Hypothesis about mu sci = 4.5, mu rel = 4.5.
TTEST /TESTVALU = 4.5 /VARI = sci.
```

$H_0: \mu = 4.5$

$\frac{s}{\sqrt{n}} = \frac{.775688}{\sqrt{381}}$

One-Sample Statistics

	N	Mean ($\bar{Y}$)	Std. Deviation (s)	Std. Error Mean
sci	381	5.12012	.775688	.039740

as N ↑ SE ↓

One-Sample Test

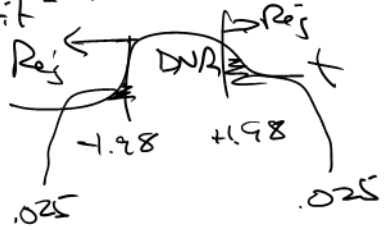
	Test Value = 4.5			$\bar{Y}-\mu_0$
	t	df	Sig. (2-tailed)	Mean Difference
sci	15.605	380	.000	.620122

$t = \frac{5.1202-4.5}{.03974}$ $n-1$

$P(t \le 15.605 \text{ OR } t \ge 15.605) = .0000\ldots$ IF H_0 true

df = 380 [table Max = 120]

$t_{crit} = 1.98$



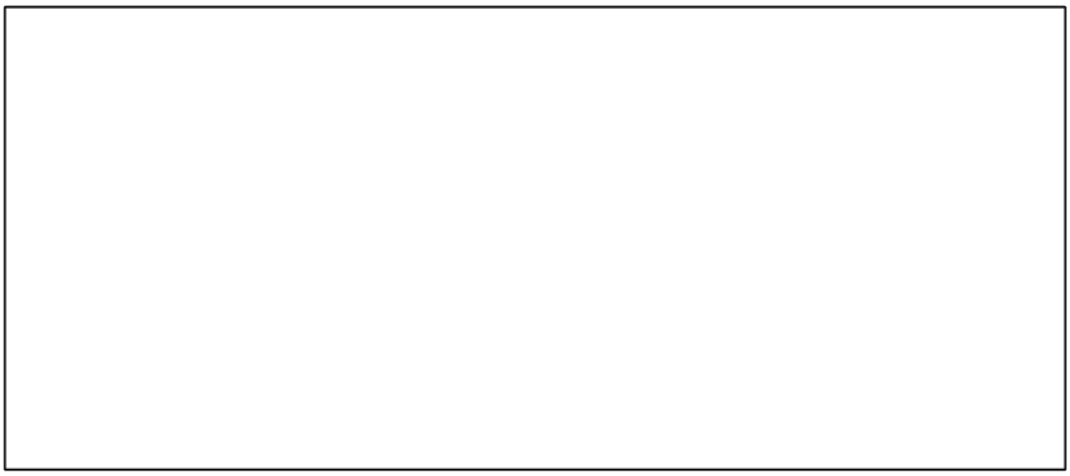

```
TTEST /TESTVALU = 4.5 /VARI = rel.
```

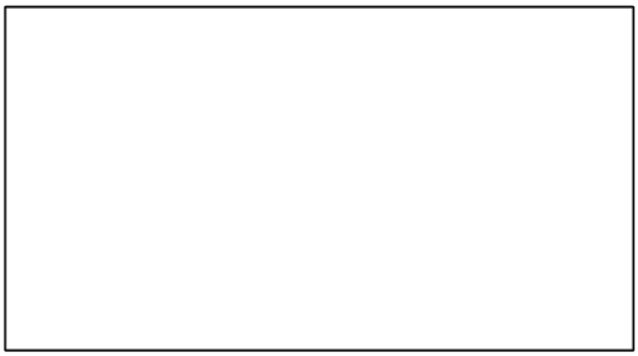
One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
rel	381	3.60728	1.475327	.075583

One-Sample Test

	Test Value = 4.5			
	t	df	Sig. (2-tailed)	Mean Difference
rel	-11.811	380	.000	-.892717





Ind t $H_0: \mu_1 = \mu_2$ $[\mu_1 - \mu_2 = 0]$

H_a ?

```
*diff on rel.
TTEST GROUP = gender /VARI = rel.
```

$SS_1 = (89-1)1.27444^2$

Group Statistics

	Gender	N	Mean	Std. Deviation
rel	1	89	3.18230	1.274440
	2	292	3.73682	1.509650

$$t = \frac{(\bar{Y}_1 - \bar{Y}_2) - 0}{\sqrt{s_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \quad \left.\right\} SE_{\bar{Y}_1 - \bar{Y}_2}$$

$$\frac{SS_1 + SS_2}{n_1 + n_2 - 2} = 2.127$$

$df = n_1 + n_2 - 2 = 379$

Independent Samples Test

	t-test for Equality of Means				
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
rel	-3.140	379	.002	-.554512	.176587

$t = \frac{-.554512}{.176587}$

$\bar{Y}_1 - \bar{Y}_2$

$\sqrt{F}$

	Gender	N	Mean
rel	j = 1	n_1 = 89	$\bar{y}_1$ = 3.18230
	j = 2	n_2 = 292	$\bar{y}_2$ = 3.73682
		weighted →	$\bar{y}_G$ = 3.60728

−.42498
+.12954

```
MANOVA rel BY gender(1 2).
```

$\sum n_j(\bar{y}_j - \bar{y}_G)^2$
$= 89 \times -.425^2 + 292 \times +.130^2$
$= 20.974$

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	806.13	379	2.13		
Gender	20.97	1	20.97	9.86	.002
(Model)	20.97	1	20.97	9.86	.002
(Total)	827.10	380	2.18		

$N-k = 391-2$ → 379 ; $k-1 = 2-1$ → 1 ; s_p^2

t_{IND}^2

R-Squared = .025 Adjusted R-Squared = .023

```
REGRESS /DEP = rel /ENTER gender.
```

Model	R	R Square
1	.159	.025

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.973	1	20.973	9.861	.002
	Residual	806.131	379	2.127		
	Total	827.105	380			

$SS_{reg} = \sum(\hat{y} - \bar{y})^2$; F

$\hat{y} = 2.628 + .555X$

Model		Unstandardized Coefficients B	Std. Error	t	Sig.
1	(Constant)	2.628	.321	8.193	.000
	Gender	.555	.177	3.140	.002

$\bar{y}_1 - \bar{y}_2$; t_{IND}

X	$\hat{y} \approx \bar{y}_j$	$(\hat{y} - \bar{y})^2$
1	3.183	× 89
2	3.738	× 292

$\bar{y} = 3.60728 = \bar{y}_G$

```
*Dependent t; do average of rel and sci scores differ (not meaningful?).
TTEST PAIRED rel sci.
```

		Mean	N	Std. Deviation
Pair 1	rel	3.60728	381	1.475327
	sci	5.12012	381	.775688

		N	Correlation	Sig.
Pair 1	rel & sci	381	-.474	.000

		Paired Differences					
		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 1	rel - sci	-1.512839	1.965760	.100709	-15.022	380	.000

$H_0: \mu_D = 0$

H_a?

$t = \frac{\bar{Y} - \mu}{S/\sqrt{n}}$

$t_{dep} = \frac{\bar{D} - \mu}{S_D/\sqrt{n_D}}$

```
COMPUTE diff = sci-rel.
TTEST TESTVALUE = 0 /VARI = diff.
```

$\bar{D}$ S_D $S_D/\sqrt{n_D}$

	N	Mean	Std. Deviation	Std. Error Mean
diff	381	1.51284	1.965760	.100709

	Test Value = 0			
	t	df	Sig. (2-tailed)	Mean Difference
diff	15.022	380	.000	1.512839

$\bar{Y}_1 - \bar{Y}_2$

$n_D - 1$

Vs. $(\bar{Y}_1 - \bar{Y}_2) - 0$

$t_{IND} = \frac{1.512839}{\sqrt{1.389\left(\frac{1}{381} + \frac{1}{381}\right)}}$

$= \frac{1.512839}{.0854}$

$= 17.716$

$> t_{Dep}$???

$r = -.474$

$s_p^2 < s_D^2$

< 1.962

```
*analyses: sci rel & gender; gender controlling for rel.
CORR sci rel gender.
```

Correlations

	sci	rel
rel	-.474	
	.000	
	381	
Gender	-.153	.159
	.003	.002
	381	381

$s_D^2 = s_1^2 + s_2^2 - 2r_{12}s_1 s_2$

$= 1.475^2 + .77^2 - 2(-.474)(1.475)(.77)$

$= 3.863$

```
GRAPH  /SCATTERPLOT(BIVAR)=rel WITH sci by gender.
```