General Linear Hypothesis Testing

Example: 2 x 2 design: A * B

1. Means table (A in rows, B in columns):

20	40
60	20

2. Regression output (four coefficients: C1, C2, C3, C4):

```
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   20.000      1.581  12.649 0.000225 ***
A2            40.000      2.236  17.889 5.74e-05 ***
B2            20.000      2.236   8.944 0.000864 ***
A2:B2        -60.000      3.162 -18.974 4.55e-05 ***
```

3. Reconstruct the means from the regression coefficients

4. Set up a matrix with values 0, +1 or -1 to get at the contrasts that you want to test. The matrix has as many columns as there are coefficients (4 here).

5. Run this using the multcomp package.

```
      Simultaneous Tests for General Linear Hypotheses
Fit: lm(formula = score ~ A * B, data = dfr)

Linear Hypotheses:
       Estimate Std. Error t value Pr(>|t|)
             Estimate Std. Error t value Pr(>|t|)
M11-M12 == 0  -20.000      2.236  -8.944  0.00259 **
M21-M22 == 0   40.000      2.236  17.889  < 0.001 ***
M11-M21 == 0  -40.000      2.236 -17.889  < 0.001 ***
M12-M22 == 0   20.000      2.236   8.944  0.00259 **
```