1. Figure A is an infinite sinewave in the x' direction, with phase = 0, period = 16, mean = 0 and amplitude = 1. (30%)
   a. Write the equation for f(x',y').
   b. Write the equation for f(x,y).
   c. Graph the 3 profiles, f(x',0), f(x,0) and f(0,y), on 3 graphs, all with the same abscissa scale.

2. Figure B is an infinite checkerboard pattern with period = 15, minimum = 0 and maximum = 255. Given that f(x,y)**δ(x-a,y-b) = f(x-a,y-b), write 2 equations for f(x,y) in Figure B, one using the “delta” function and the other using the “comb” function. (20%)

3. (30%)
   a. Find the Fourier transform of f(x,y) in Figure A. Sketch F(u,v) in 2-D.
   b. Find the Fourier transform of f(x,y) in Figure B. Sketch F(u,v) in 2-D.

4. Verify your answer in Problem 3b by doing the Fourier transform using tclSADIE. Use File/New and Geometry/Rotate to create the various functions you’ll need to generate f(x,y), Filter/Power Spectrum to get |F(u,v)|^2 and Contrast/Square Root Stretch to get |F(u,v)|. The spectrum amplitude you get from tclSADIE may not be exactly correct because of some uncontrollable scaling factors in its FFT algorithm, but the frequencies and relative sizes of spectral components should be correct. (20%)
HOMEWORK #3 (counts as 2 homeworks)
2/16/00
DUE: in-class February 22, 2000

FIGURE A

FIGURE B

30°