Radio Astronomy Homework 6

Q 6.1 : The important concept of an interferometer is in fact to think of it as a single dish telscope but with unfilled aperture. For example, one can make a simple interferometer from a one dimensional paraboloid by masking off all of the reflecting surface except for two regions of dimension a, which are separated by a length b, where $b \gg a$. The power incident on these two regions is reflected without loss, then *coherently* received at the prime fous. A receiver there amplifies and squire law detects these signals.

Write out a one-dimensional version of equation (6.12) of "Tools of Astronomy", and identify terms. Apply this equation and equation (6.13) to determine the far field diffraction pattern of this instrument.

Reference:

Equation (6.12)

$$f(n) = \frac{1}{2\pi} \int\int_{-\infty}^{\infty} g(x')e^{-ikn\cdot x'} \frac{dx'}{\lambda} \frac{dy'}{\lambda}$$

Equation (6.13)

$$P_n(n) = \frac{P(n)}{P_{max}} = \frac{|E \cdot E^*|}{|E \cdot E^*|_{max}}$$