Fraunhofer Diffraction Geometry

Under the Fraunhofer conditions, the wave arrives at the single slit as a plane wave. Divided into segments, each of which can be regarded as a point source, the amplitudes of the segments will have a constant phase displacement from each other, and will form segments of a circular arc when added as vectors. In this way, the single slit intensity can be constructed.

Fit the pattern you get to this expression. You could use software like Origin, Matlab, Mathematica, GNU plot etc. to do this.
Single-slit and double-slit diffraction pattern

Answers must be extremely brief

1. What is the difference between diffraction and interference?
2. What is the difference between Fraunhofer diffraction and Fresnel diffraction?
3. Draw the diffraction pattern obtained from a single slit. Give the mathematical expression of the intensity, define all the parameters used in this expression.
4. Draw the double slit diffraction pattern. Give the mathematical expression of the intensity, define all the parameters used in this expression.
5. In the single and double slit patterns indicate contributions due to interference and diffraction.
6. How is the spacing between maxima (or minima) related to the wavelength? How is the spacing between maxima (or minima) related to the distance between slits? How is the spacing between maxima (or minima) related to the distance?
7. Monochromatic light from a distant source is incident on a slit 0.8 mm wide. On a screen 3 m away, the distance from the central maximum of the diffraction pattern to the first minimum is measured to be 2 mm. What is the wavelength of the light?
8. A He-Ne laser (wavelength $\lambda = 633\text{nm}$) shines through a double slit of unknown separation $d$ onto a screen 2.00 m away from the slit. The distance on the screen between the $m=4$ maxima on either side of the central maximum of the two-slit diffraction pattern is measured and is found to be 3.4 cm. What is the separation $d$ of the two slits?
9. Monochromatic light ($\lambda = 450\text{ nm}$) is incident normally on an opaque screen containing a pair of narrow slits separated by 0.2 mm. If the spacing between interference fringes observed on a second screen is 1.5 cm, how far is the second screen from the two slits?
10. For the triangle shown below, what is the angle $\theta$ in radians and in degrees? What would be your answer if you made the small angle approximation ($\sin \theta \approx \tan \theta \approx \theta$)? What would be your % error in $\theta$ if you made the small angle approximation?

11. Draw the diffraction pattern due to $3/4$ slits.
12. For a given slit how does the pattern vary if the wavelength of light is varied.
13. Find a good simulation online and play with it.

Numerical questions are from:
http://www.ece.mtu.edu/labs/EElabs/EE3391/Slit_Diffraction_and_Interference.doc