PART D

For designing a CT scanner, the trade off is between the resolution of the radon transform(i.e the image quality) and the time taken to complete the scan. If the time taken is too large so as to increase the resolution of the radon transform by increasing the step size, the patient will be exposed to large amount of radiations and if the step size taken is too large so as to decrease the amount of time the patient is exposed to the radiation, the resolution is not good enough for disgonosis. The effect of step size can be seen in the previous three plots, because as the step size decreases the resolution increases. This tradeoff makes it difficult to choose the value of step size will be decided by the accepted radiation levels and the image quality needed.

PART E

For a slice of a particular theta, in ART Ax=b, elements of x determine the attenuation coefficients of all t separated by a step size of deltaS. This x is unknown. The value of an element of A is the value at a particular value of (theta,t), and the value that we get at b is the received value.Thus, no of grid pixels is proportional to no of thetas and no of t's. Increasing any of them, meaning decreasing deltaS or deltaTheta would increse the scan time and hence the exposure to radiation. If deltaS >> 1, then x has very few elements and number of columns of A are very less. if deltaS << 1, then x has large amount of elements and the number of columns in A are large and accordingly the complexity of the system of equaion would increase.
Also increasing the number of pixels i.e. size of A would increase the complexity of the system of equation.