EECS 145b, Spring 1995
Practice Final
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Problem #1

Which one of the following is the best pulse sequence for distinguishing between tumor and white matter?
The T1 of white matter is 600 milliseconds. The T2 of white is 30 ms.
The T1 of Tumor is 700ml. The T2 is 60 ml. Choose from:
a) TR = 1000 TE = 80
b) TR = 500 TE = 30
c) TR = 1000 TE = 30

Problem #2

What is the likelihood that the 2 groups listed below are from the same population?
a. 6,6,4,8,7,3,10,9,8
b. 10,11,6,3,5,7,5,6,7

Problem #3

Fit the following data to the model y=a+bx+cx^2

y	x
1	0
2	2
3	4
4	7

Problem #4

The convolution of a round aperture with the object results in a distortion depending on the size of the aperture and the shape of the object. Show why the product of the appropriate Bessel function and the object can be used to estimate the distortion of the image.

Problem #5

Show by a block diagram the reconstruction method using the Fourier projection theorem to perform the reconstruction from 36 projections of transmitted photons through a chest of unknown contents. This question calls for details of every aspect o the problem, including statemets of the applicable theorems.

Problem #6

Draw the wave form corresponding to the Fourier coefficients
F(1)=d.c.=2; F(4)=2,i0; F(7)=o,i1)....Plus negative frequencies to N=32

Problem #7

A submarine moving north at 25 knots launches a torpedo due east at 50 knots. What is the expected frequency shift of a 1 Mhz sound signal if the torpedo is running true?

Problem #8

You are to find a hidden burial chamber under Memorial Stadium. You have three linear arrays of magnetic sensors and magnetic source transducers 50 meters long. You can drill one bore hole about 100 meters deep. The cave is believed to be about 10 meters on a side and could be as much as 90 meters deep. Show how you would position these arrays to get the best opportunity to detect the cave having metal objects of great worth.

Problem #9

How many events do you need to detect a 10m on the side object in a telescope field of 10km by 10km if the emissions from the object are 10 times the background emissions and the generator of the emissions is Poisson?

Problem #10

What is the position of a frequency spike for a a 60 Hz noise signal in the EEG recorded on a domain of 1024 if the time increments are 20 ms?