Homework #11

1. You need to acquire an x-ray image of a small animal for one of your research projects. Because of the specific requirements of your experiments, a spatial resolution of 25 *lp/mm* or higher is needed. Indeed the spatial resolution is the most important requirement of this experiment. What x-ray imaging modality would you use?

Solution:

X-ray film only.

2. What is PACS (the definition of PACS)? What are the key components of a mini-PACS system?

Solution:

A **PACS** is a system for the storage, transfer, and display of radiological images.

Picture—captures the image.
Instead of being printed on film, the captured images are sent directly from the diagnostic imaging modality to your PACS.

Archive—stores the image.
Images are now permanently stored in an electronic archive.

Communication—distributes the image.
This aspect includes how the images are viewed throughout the hospital on both diagnostic and clinical workstations as well as how the images are made available to the referring community.

System—manages the integration and interface to other clinical systems.

A PACS may be devoted to only a single modality at a medical facility. In this case, the entire PACS may be connected by a single LAN. Such a small, single-modality PACS is sometimes called **mini-PACS**.

3. What is DICOM (the definition of DICOM)?

Solution:

- The American College of Radiology and the National Electrical Manufacturers' Association jointly sponsor a set of standards called Digital Imaging and Communications in Medicine (**DICOM**) to facilitate the transfer of medical images and related information.
- DICOM includes standards for the transfer, using computer networks, of images and related information from individual patient studies between devices such as imaging devices and storage devices.

- ❖ DICOM specifies standard formats for the images and other information being transferred, services that one device can request from another, and messages between the devices.

4. Please describe the most important difference of projection radiography and X-ray CT.
   Solution:

   Projection radiography is 2D imaging and CT is 3D imaging

5. A clinician needs to select one modality to guide a surgical procedure in real time. Suppose all of the following imaging modalities, MRI, CT, Project Radiography, Fluoroscopy and ultrasound, can provide clear images for the specific region-tumor of the patient. Which modality would he/she select? Why?
   Solution:

   Ultrasound, it is real time and 3D