

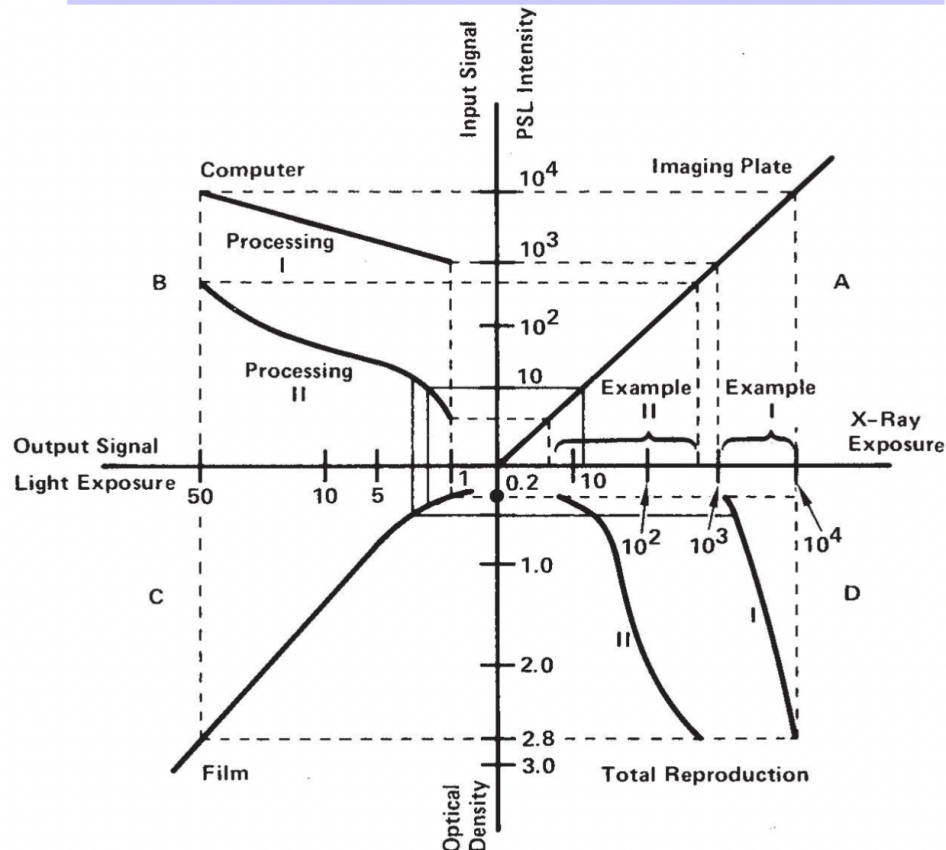
Assignment 3

1. Describe the similarities and differences between a laser film scanner and a computed radiography (CR) system.

Laser Film Scanner	Computed Radiography System
Similarities -	
1. Image Output: Digital Image	
Digitizes traditional X-ray films	Produces digital images.
2. Use of Laser: scanner and reader	
The scanner uses a laser beam to illuminate the film.	CR reader uses a laser to stimulate the phosphor on PSP to emit light
3. Both are used in Medical Imaging Applications.	
4. Both the x-ray film and plate have to be sensitive to light to capture the image.	
5. Both offer easier storage, retrieval, and sharing of medical imaging data.	
6. Both are designed to integrate with digital workflows, they are compatible with digital hospital information systems	
Differences -	
1. Imaging Process:	
Utilizes laser light to scan traditional X-ray films and convert them into digital images. The scanner uses a laser beam to illuminate the film, and the light is detected by photodetectors to create a digital representation of the X-ray image.	X-rays are absorbed by the PSP, creating a latent image. After exposure, the plate is processed in a CR reader, where a laser stimulates the phosphor to emit light. This light is captured and converted into a digital image.
2. Environmental Effects: Chemical Usage	
Chemicals are required to make traditional X-ray films.	No chemicals are required frequently with the films.
3. Efficiency:	
Physical handling of films is required, which can be very tedious and slow.	Faster in producing digital images as they don't require the physical handling of films.

2. Based on the figure shown in the lecture slides, please explain how the CR system compensates for X-ray underexposure (Case II).

Imaging Plate Characteristics



- On the x-axis, we have X-ray exposure. The underexposed X-ray would fall in the Example II section. The Imaging Plate is a Linear Detector, and we want a target range that looks good.
- For Underexposed X-ray, we will use Processing II from the LOOKUP TABLE (LUT), using which we will try to remap the image
- We would dynamically try to rescale and spread the compact range of pixels to a wider range to enhance the image's brightness and contrast.
- The rescaling process involves mapping the original pixel values to new ones based on a desired target range of pixel values.
- Now we are in the film's Characteristic curve (Light Exposure to Optical Density), avoiding the shoulder.