## Tutorial Questions

1. Briefly not the advantages that SR light has over other sources for the following regions of the spectrum:
a) Infra red

b) Optical

c) Ultra violet

d) X-ray

2. At x-ray wavelengths the refractive index of a substance which is denser than air is:
a) Exactly 1.0 b) Negative c) Slightly less than 1

3. For a given material the x-ray phase shift at its interface as a function of photon energy goes as:
a) $E^{-1}$ b) $E^{-2}$ c) $E^{-3}$

4. A CT reconstruction takes what sort of data as its input?:
a) An interferogram b)A 1-D projection of the object c) An array of the attenuation coefficients

5. The most often used way to focus soft x-ray light is with:
a) A fresnel lens b) An electric field c) A glass lens

6. The vertical plane which divides the body left and right is called the:
a) Transverse plane b) Caudal plane c) Sagittal plane

7. In FLIM the fluorescence lifetime of a fluorophore is governed by:
a) The Ph b) Proximity to a ligand c) Nearby ions

8. A certain detector converts an x-ray photon to many longer wavelength photons before converting to electrons. This process is known as:
a) Indirect conversion b) Direct conversion c) Optical conversion

9. The dominant interaction process for x-ray of 12 keV (1 angstrom) is:
a) Photoelectric absorption b) Compton scattering c) Pair production

10. The projection of the attenuation of a 2-D slice through an object into 1 dimension is known as:
a) A Radox transform b) A Radical transform c) A Radon transform

11. A fluorescence tomography instrument uses what kind of emission from the object to create the image:
a) Coherent scatter b) The unscattered photons c) Fluorescence photons

12. In bone the fraction of coherently scattered 60 keV photons is around:
a) 6% b) 36% c) 60%

13. In FRET the fluorescence lifetime is dependent on the distance between the donor and acceptor fluorophore to the power:
a) 6 b) 5 c) 7

14. The transverse coherence length on the SRS is:
a) 1 mm b) 1 cm c) less than a micron

15. For a given material the x-ray phase absorption as a function of photon energy goes as:
a) $E^{-2}$ b) $E^{-3}$ c) $E^{-4}$

16. An image plate phosphor makes use of a phenomenon known as:
a) Photo-stimulated luminescence b) Stimulated photo-luminescence c) Luminescent photo-stimulation

17. In direct radiography detector the acronym TFT stands for:
a) Transverse Fourier transform b) Thin film transistor c) Thick foil transmutation

18. Name some pros and cons for using CCD sensors rather than CMOS sensors.

18. Name some pros and cons for using photon counting rather than integrating imaging detectors.