1. Indicate whether each of the following statements is true (T) or false (F).
   a. visible light is electromagnetic radiation from $10^{-15}$ m to $10^4$ m in length T / F
   b. colored light is visible electromagnetic radiation from ~300-1300nm T / F
   c. at low light levels peak retinal sensitivity is around 400-420nm T / F
   d. at high light levels peak retinal sensitivity is around 550-555 nm T / F

2. What photoreceptors are active in responding to light in:
   a) photopic vision ____________________________
   b) scotopic vision ____________________________
   c) mesopic vision ____________________________
   d) total darkness ____________________________

3. Indicate whether each of the following statements is true (T) or false (F).
   a. all cold sources reflect 80% blue light T / F
   b. artificial lamps all produce yellow/orange light T / F
   c. the hottest objects always appear bright red T / F
   d. blue light has a higher color temperature than red light T / F
   e. sunlight has a color temperature of ~5,000 degrees K T / F
   f. color temperature accurately measures color appearance T / F
   g. different spectral compositions can have the same color temperature T / F
   h. different spectral compositions can change the colors of objects T / F

4. What characteristics of light produce the following sensations?
   a. sensation of color ____________________________
   b. sensation of brightness ____________________________

5. In the Munsell color cone diagram, what do the following represent?
   a. central, vertical axis ____________________________
   b. central equator ____________________________
   c. distance from central, vertical axis ____________________________

6. What do the following units measure?
   a. lumen ____________________________
   b. candela ____________________________
   c. foot candle ____________________________
   d. foot lambert ____________________________

7. In the C.I.E. system, what do the following symbols represent?
   a. Z ____________________________
   b. X ____________________________
   c. y ____________________________
   d. z ____________________________
8. Indicate whether each of the following statements is true (T) or false (F).
   a. all colors can be specified with 2 chromaticity coordinates T / F
   b. color saturation is lowest at the center of the chromaticity diagram T / F
   c. pure colors always have a single chromaticity coordinate T / F
   d. artificial black light is colorless light T / F
   e. the spectrum locus is the most central point of the chromaticity diagram T / F
   f. chromaticity determines the brightness of a color T / F
   g. color temperature can be plotted on the chromaticity diagram T / F

9. From the inverse square law, calculate the missing values for the following situations.
   a. source = 1-cd, distance = 3m, illuminance = ______ footcandles
   b. source = 200-cd, distance = 5m, illuminance = ______ lux
   c. source = ______, distance = 2m, illuminance = 50 footcandles
   d. source = 150-cd, distance = ______ feet, illuminance =100 lux

10. Calculate the missing values for the following conditions.
    a. luminance = 40 fL, illuminance = 80 fc, reflectance = ______
    b. luminance = 20 cd/m², illuminance = 450 lux, reflectance = ______
    c. luminance = ______ fL, illuminance = 550 lux, reflectance = 0.6
    d. luminance = 50 fL, illuminance = ______ fc, reflectance = 0.8
    e. luminance = ______ cd/m², illuminance = 28 fc, reflectance = 0.7
    f. luminance = 100 cd/ft², illuminance = ______ lux, reflectance = 0.25

11. Indicate whether each of the following statements is true (T) or false (F).
    a. lamps of the same wattage have the same light output T / F
    b. lamps of the same wattage can have different color temperatures T / F
    c. fluorescent lamps use more energy than incandescent lamps T / F
    d. incandescent lamps always last longer than fluorescent lamps T / F
    e. fluorescent lamps produce more light per watt than incandescent lamps T / F

12. Indicate whether each of the following statements is true (T) or false (F).
    a. visual acuity and contrast are the same thing T / F
    b. tasks with high contrast require low illumination levels T / F
    c. increasing illuminance changes visibility but not contrast T / F
    d. visibility is affected by exposure time to the target T / F

13. Indicate whether each of the following statements about the color rendering index (CRI) is true (T) or false (F).
    a. the CRI is an extremely accurate indicator of color appearance T / F
    b. a CRI of 45 improves color inspection performance accuracy T / F
    c. all colors appear to be brighter when the CRI exceeds 90 T / F
    d. all fluorescents have higher CRI values than incandescent lamps T / F
    e. all colors will appear dull under a low CRI (<80) lamp T / F
14. Indicate whether each of the following statements is true (T) or false (F).
   a. visual performance models always accurately predict task accuracy  T / F
   b. tasks performance always increases linearly with illumination level  T / F
   c. small detail, low contrast tasks require high illuminance levels  T / F
   d. visual task performance is affected by the observer’s age  T / F

15. Indicate whether each of the following statements is true (T) or false (F).
   a. low illuminance can help reduce noise levels in university corridors  T / F
   b. 950 lux is required for reading hard pencil handwriting on gray paper  T / F
   c. 300 lux is sufficient for reading good xerography (photocopies)  T / F
   d. 10,000 lux is required for surgical operating theaters  T / F
   e. public area light levels must be corrected task reflectances  T / F
   f. emergency lighting levels should always be less than 1 lux  T / F
   g. higher levels of illumination are always preferable to lower levels  T / F
   h. transient adaptation effects can reduce visibility  T / F

16. Indicate whether each of the following statements is true (T) or false (F).
   a. specular glare is caused by direct light sources in the field of view  T / F
   b. polished work surfaces can be a source of reflected glare  T / F
   c. matte surfaces absorb all of the light and decrease glare  T / F
   d. discomfort glare always impairs visual performance  T / F
   e. discomfort glare is a subjective sensation  T / F
   f. retinal adaptation processes can change perceived discomfort glare  T / F
   g. discomfort glare is always greater for older workers  T / F
   h. disability glare effects can be affected by observer’s age  T / F
   i. wearing contact lens increases disability glare effects  T / F

17. Indicate whether each of the following statements is true (T) or false (F).
   a. elderly people are most sensitive to blue light  T / F
   b. intraocular light scattering can be corrected with appropriate glasses  T / F
   c. reduced pupil diameter increases sensitivity to disability glare  T / F
   d. transient adaptation effects take longer in younger people  T / F
   e. relative contrast requirements increase linearly with age  T / F

18. Indicate whether each of the following statements is true (T) or false (F).
   a. illumination levels, luminance ratios and screen size are the three main lighting considerations with computer screens  T / F
   b. lighting is only important when computer screen characters are illegible  T / F
   c. low light levels can make it easier to see computer screen information  T / F
   d. light levels of 150-250 lux are recommended for computer screens  T / F
   e. computer screen glare filters can affect screen reading rates  T / F

19. Indicate whether each of the following statements is true (T) or false (F).
   a. the human ear is most sensitive to low frequencies ~300 hz  T / F
   b. the ear only detects frequencies from 100 to 15,000 hz  T / F
   c. a SPL meter measures the subjective pitch of a sound  T / F
21. What measures might you use for each of the following?
   a. speech
   b. aircraft noise
   c. longer term-environmental/community noise

22. Indicate whether each of the following statements is true (T) or false (F).
   a. Leq is always > SEL for sampling periods less than 1 second
   b. nerve deafness causes uneven hearing loss
   c. hearing aids are most useful for nerve deafness
   d. conduction deafness does not result in complete hearing loss
   e. conduction deafness can best be treated with hearing aids

23. Define the following:
   a. presbycusis:
   b. sociocusis:

24. Indicate whether each of the following statements is true (T) or false (F).
   a. sociocusis causes 75% of nerve deafness in the USA
   b. temporary hearing losses always last less than 2 minutes
   c. maximum temporary threshold shifts always occur at the noise exposure frequency
   d. hearing loss is mainly affected by the duration of noise exposure

25. Indicate whether each of the following statements about noise is true (T) or false (F).
   a. the permissible exposure level is a TWA of 95 dBA
   b. the noise dose is the sum of the partial noise doses
   c. a TWA of 85 dBA is the action level
   d. daily exposure to 2,000 impulse noises of 128 dB is safe

26. Calculate the following for a worker who spends 3 hours at 70 dB, 3 hours at 95 dB, 1 hour at 110 dB, 1 hour at 100 dB (show your calculations)?
   a. Noise dose =
   b. TWA, dBA (round to nearest dB) =
   c. Does this noise dose exceed the OSHA permissible exposure level? Yes/No
   d. Does any partial noise dose exceed the OSHA permissible exposure level? Yes/No

27. Name 3 acoustic and 3 non-acoustic factors affecting noise annoyance.
   a. 
   b. 
   c. 

28. Indicate whether each of the following statements is true (T) or false (F).
   a. noises with the same L_{dn} are not equally annoying  
   b. road traffic and aircraft noises are not equally annoying  
   c. >60% of people will be highly annoyed at a noise with an L_{dn} of 62 dB  
   d. noise complaints cease with an L_{dn} < 50 dB  
   e. widespread complaints occur with a normalized L_{dn} of 70 dBA  

29. Indicate whether each of the following statements is true (T) or false (F).
   a. sound readings should always be taken distant from the noise source  
   b. sound loudness and sound pressure are the same  
   c. the decibel measures the spectral power of sound  
   d. sound power is a useful measure for assessing general ambient noise  

30. Indicate whether each of the following statements is true (T) or false (F).
   a. machine noise reduction at all frequencies is best achieved by a flexible, sealed enclosure  
   b. an acoustic absorbing enclosure is most effective in reducing low frequency components of machine noise <100Hz  
   c. 6-mm thick safety glass produces peak noise reduction at 300 Hz  
   d. ear inserts always attenuate noise better than external ear muffs  
   e. hearing protectors with the lowest NRR are always the best choice  
   f. the semicircular canals are the size of a broad bean  
   g. the utricle detects horizontal motion  
   h. semicircular canals respond to a constant velocity