ASSIGNMENT SUMMARY
This exercise is intended to reinforce your understanding of human-centric lighting (HCL), including foundational considerations related to eye-brain physiology, practical considerations related to application of HCL concepts in design, and ethical considerations associated with human-centricity.

LEARNING OBJECTIVES
• Attain working familiarity with human-centric lighting concepts that are most relevant to lighting design and applied illuminating engineering, by:
  o Defining the phrase human-centric lighting, and placing this concept in a context that recognizes both the unrealistic hype and the realistic potential surrounding this phrase.
  o Explaining key aspects of human-centric lighting, including the ability to identify and define non-visual responses to light and lighting.
  o Explaining the photoreceptors within the eye and broadly describing how they are believed to interact with each other.
  o Classifying the full range of stimulus-response relationships between light and humans—e.g., what are the top-level lighting variables and what psychological and physiological outcomes do they influence?
  o Explaining the roles of different professions in advancing the science and application of human-centric lighting.
  o Summarizing design recommendations that are recommended in documents published by Well and UL.
  o Summarizing ethical considerations embodied in the very concept of human-centricity, including appreciation of short- and long-term consequences on human and non-human life.
• Infer the limits of the human-centric lighting concepts that we have covered, recognizing that the topics we studied are a baseline that invites deeper study.

QUESTIONS
Though most of these questions can be answered with reference to the readings and class discussions, you may use any source when preparing answers to these questions. Take care to be sure that your sources are credible. You are encouraged to work on this assignment with your classmates, though you are individually responsible for your own answers.
1. Using your own words, describe human-centric lighting. What are its core features and tenets?
2. The phrases “circadian lighting” and “human-centric lighting” are sometimes used interchangeably. Explain why doing so is a mistake.
3. Create a list of non-visual responses to light and lighting. Make your list as specific and comprehensive as you can.

4. What is an eye/brain circuit? Refer to the diagram from Tara LeGates and her colleagues (refer to the lecture notes). Pick any eye/brain circuit and explain how that one circuit can be expected to mediate a human response.

5. Briefly explain the four top-level lighting variables that can manipulated by lighting designers in applied lighting settings and by researchers in experimental contexts.

6. The ipRGCs have intrinsic and extrinsic responses. Explain what that means.

7. Define these terms, all of which are influenced by light, and give at least one example of each of them:
   a. Visual response
   b. Circadian response
   c. Neuroendocrine response
   d. Neurobehavioral response

8. Explain melanopic equivalent daylight illuminance. What is it? What are its units? How is it interpreted?

9. What is external validity and why is it an important consideration when evaluating claims about human-centric lighting?

10. Based on what you have read, to what manner and degree might it be possible to use light to enhance alertness? Under what circumstances might light have the greatest potential to enhance alertness? Under what circumstances might light have little or no effect on alertness? What is your level of conviction in responding to these questions about the effect of light on alertness?

11. Imagine that you are part of a design team that will be designing the lighting for a new hotel. Summarize some of the considerations in each step of the 5-step design process that was outlined in article by Houser and Esposito.

12. Briefly contrast the recommendations in the WELL Building Standard v2.0 and UL 24480. In what ways are they comparable and in what ways are they different?

13. Use Google (or any other search engine) to identify three lighting equipment manufacturer websites that tout either human-centric lighting, or lighting products purported to support human-centric lighting. Provide the website URL, summarize their claims, and provide brief evaluative commentary. Explain in what ways their product claims are reasonable and/or unreasonable.

14. Briefly explain some of the ethical considerations associated with human centricity in the context of electrically generated light.

**SUBMISSION FORMAT**

Upload your answers to Canvas in a single document. Type your written answers, though please also feel free to include hand drawn sketches if they support your answers. Take care with clarity, concision, and completeness. Proofread and edit carefully. Your target should be a work product that is professional in content and appearance, something that you would be pleased to share with a prospective employer as an example of your work.