Lecture Quiz 1

(1) Latent heat of vaporization is the

a. The energy input required to evaporate a unit mass (e.g., 1 kg) of liquid water.
b. The energy input required to condense a unit mass (e.g., 1 kg) of water vapor.
c. The energy input required to melt a unit mass (e.g., 1 kg) of ice.
d. The energy released when a unit mass (e.g., 1 kg) of liquid water evaporates.
e. The energy input required to evaporate a unit mass (e.g., 1 kg) of liquid water or ice.

(2) Which of the following is correct? Short-wave radiation makes up the majority of radiation emitted by:

a. All of the answers below
b. The moon
c. Earth's atmosphere and surface
d. Plants
e. The sun

(3) Spectral absorptivity of a green leaf is:

a. Greater for photosynthetically active radiation (PAR) than near infrared radiation (NIR)
b. Greater for $\lambda = 0.55\ \mu m$ (green light) than $\lambda = 0.45\ \mu m$ (blue light)
c. Lower for $\lambda = 0.55\ \mu m$ (green light) than $\lambda = 0.45\ \mu m$ (blue light)
d. Both a and b are correct
e. Both a and c are correct

(4) Generally:

a. The albedo of snow covered surfaces is lower than that of vegetated surfaces
b. The albedo of snow covered surfaces is approximately equal to that of vegetated surfaces
c. The albedo of snow covered surfaces is higher than that of vegetated surfaces
d. The albedo of snow covered surfaces is higher than that of vegetated surfaces but the reflectivity is not
e. The albedo of snow covered surfaces is higher than that of vegetated surfaces and so is the absorptivity

(5) Which of the below are valid units for radiant flux density

a. $\mathrm{W\ m^{-2}}$

b. $\mathrm{J\ s^{-1}\ m^{-2}}$

c. $\mathrm{W\ kg^{-1}}$

d. $\mathrm{J\ m^{-2}}$

e. a. is the most concise options, but b. would work as well

(6) According to _____ law, the wavelength of maximum intensity will get _____ as an object gets _____.

a. Stefan-Boltzmann's Law, longer, hotter
b. Wein's Law, longer, hotter
c. Stefan-Boltzmann's Law, shorter, hotter
d. Wein's Law, shorter, cooler
e. Wein's Law, shorter, hotter

(7) Beer's Law modified for plant canopies (i.e., $R_u = R_0 e^{\frac{-GL\Omega}{cos\theta}}$) predicts that:

a. Solar irradiance decreases linearly as a function of depth into the canopy
b. Solar irradiance at the forest floor is higher for canopies with a higher cumulative leaf area index (L).
c. Solar irradiance at the forest floor is constant throughout the day
d. None of the above are true
e. All of the above (excluding d.) are true

(8) The cosine law of illumination describes:

a. How the solar beam is spread across the Earth's surface as a function of the solar zenith (θ).
b. How solar irradiance on the Earth's surface increases as you move closer to the North (or South) Pole.
c. How solar irradiance on the Earth's surface decreases at solar noon relative to other times of day.
d. Both a & b are True
e. Both a & c are True

(9) Which of the following statements are true:

a. Heat can do work, temperature cannot.
b. Heat usually flows from a hotter object to a colder object, but it can do the opposite if there is enough of an energy imbalance between the two objects.
c. Heat is an quantification of the total energy present in an object, temperature is a relative measure of our perception of heat.
d. Both a & c are True
e. a, b, & c are all True

(10) The table below shows measurements of incoming and outgoing short-wave radiation above an aspen forest on a sunny late-winter day in northern Alberta. Which of the statements bellow best describes these data.

Time	$SW \downarrow$ W m^{-2}	SW $\uparrow$ W m^{-2}	Albedo
10:00	200	150	0.75
11:00	250	190	0.76
12:00	300	234	0.78
13:00	250	190	0.76
14:00	200	150	0.75

a. These data appear incorrect; outgoing short-wave radiation should be higher than incoming short-wave radiation
b. These data appear incorrect; the albedo should be lower in winter because there sun angle is lower
c. These data appear reasonable for a forest with some snow-cover in late winter
d. These data appear incorrect; $SW \downarrow$ W m $^{-2}$ and $SW \uparrow$ W m $^{-2}$ look plausible but it appears that albedo not calculated correctly
e. These data appear reasonable for a forest without snow-cover in late winter