AY121 Course Assessment Questions—Lab 2 related

YOUR NAME:

1. Right Ascension, Civil Time, Sidereal Time, and Hour angle are related by which of the following?

   (a) Civll time = Sidereal time - Right Ascension

   (b) Civil time = Sidereal time + Right Ascension

   (c) Hour angle = Sidereal time + Right Ascension

   (d) Hour angle = Sidereal time - Right Ascension **correct**

   (e) Civil Time = hour angle + right ascension

2. You are pointing your telescope to a star located at (right ascension, declination) (α, δ) and the telescope's mount uses the angles (azimuth, altitude) (az, alt). Let the rotation matrix that converts between two coordinate system be designated by subscripts—for example, the matrix for converting (hour angle, declination) to (right ascension, declination) be $\mathbf{R}_{(ha,dec)\rightarrow(ra,dec)}$. Which of the following matrix equations is correct?

   (a) $\mathbf{R}_{(az,alt)\rightarrow(\alpha,\delta)} = \mathbf{R}^{-1}_{(\alpha,\delta)\rightarrow(ha,\delta)} \cdot \mathbf{R}^{-1}_{(ha,\delta)\rightarrow(az,alt)}$ **correct**

   (b) $\mathbf{R}_{(az,alt)\rightarrow(\alpha,\delta)} = \mathbf{R}^{-1}_{(\alpha,\delta)\rightarrow(ha,\delta)} \cdot \mathbf{R}_{(ha,\delta)\rightarrow(az,alt)}$

   (c) $\mathbf{R}_{(az,alt)\rightarrow(\alpha,\delta)} = \mathbf{R}_{(\alpha,\delta)\rightarrow(ha,\delta)} \cdot \mathbf{R}^{-1}_{(ha,\delta)\rightarrow(az,alt)}$

   (d) $\mathbf{R}_{(az,alt)\rightarrow(\alpha,\delta)} = \mathbf{R}_{(\alpha,\delta)\rightarrow(ha,\delta)} \cdot \mathbf{R}_{(ha,\delta)\rightarrow(az,alt)}$

3. The Julian Day begins:

   (a) at midnight on the international date line

   (b) at noon on the international date line

   (c) at midnight in Greenwich, England

   (d) at noon in Greenwich, England **correct**

4. The 21-cm line is emitted by

   (a) atomic H in interstellar space **correct**

   (b) molecular H in interstellar space

   (c) ionized H in interstellar space

   (d) molecular H in planetary and stellar atmospheres

   (e) atomic H in in planetary and stellar atmospheres

   (f) ionized H in planetary and stellar atmospheres

5. The Galactic coordinate system is normally denoted by the letters (ℓ, b) and

   (a) is centered on the Sun and has the zero point of longitude towards the Galactic center **correct**

   (b) is centered on the Galactic center and has the zero point of longitude towards the Sun

   (c) is centered on the Sun and has the zero point of longitude towards the direction of Galactic rotation

   (d) is centered on the Sun and has the zero point of longitude opposite the direction of Galactic rotation

   (e) is a left-handed coordinate system

6. When combining data to increase the signal/noise ratio,

   (a) it is always best to take the average

   (b) it is always best to take the median

   (c) it is usually best to take the average, subsequently locate bad data points, and do the average again. **correct**

   (d) it is usually best to take the median, subsequently locate bad data points, and do the median again.

7. Taking an average of data with Gaussian statistics is identical to (check all that apply)

   (a) taking a median

   (b) doing a 1-parameter least squares fit **correct**

   (c) doing a multiparameter least squares fit

   (d) Doing a Fourier transform, removing all frequency components but D.C., and taking the inverse transform **correct**

8. You have a series of J measurements x_j whose statistics are Gaussian, with mean $\langle x \rangle$ and dispersion σ_x.

   (a) The dispersion $\sigma_x = \frac{\sum x_j}{J}$

   (b) The dispersion $\sigma_x = \frac{\sum x_j}{J-1}$

   (c) The dispersion $\sigma_x = \frac{\sum x_j}{J(J-1)}$

   (d) The dispersion $\sigma_x = \left[\frac{\sum (x_j - \langle x \rangle)^2}{J}\right]^{1/2}$

   (e) The dispersion $\sigma_x = \left[\frac{\sum (x_j - \langle x \rangle)^2}{J-1}\right]^{1/2}$ **correct**

   (f) The dispersion $\sigma_x = \left[\frac{\sum (x_j - \langle x \rangle)^2}{J(J-1)}\right]^{1/2}$

9. When transmitting power through a waveguide and radiating it into space, the highest efficiency occurs when:

   (a) the Voltage Standing Wave Ratio in the waveguide equals one **correct**

   (b) the Voltage Standing Wave Ratio in the waveguide equals equals zero

   (c) The impedance of the waveguide is 50 ohms

   (d) The impedance of the waveguide is equal to that of free space

10. The cutoff frequency of the TE01 mode in a rectangular waveguide

   (a) occurs because the phase velocity $\rightarrow 0$ as the frequency approaches cutoff from above

   (b) occurs because the phase velocity $\rightarrow 0$ as the frequency approaches cutoff from below

   (c) occurs because the phase velocity $\rightarrow \infty$ as the frequency approaches cutoff from above **correct**

   (d) occurs because the phase velocity $\rightarrow \infty$ as the frequency approaches cutoff from below