Assignment 4

Due on 2019-08-28, 20:59 IST.

1. Which of the following relations is not a Maxwell relation?  (1 point)
   a) \[ \sigma = \tau (\theta) \]
   b) \[ \sigma = \Gamma (\theta) \]
   c) \[ \sigma = \sigma (\theta) \]
   d) \[ \sigma = \Gamma (\theta) \]

   Correct Answer: (c)

2. Consider the function \( z(x,y) \), its partial derivatives \( \left( \frac{\partial z}{\partial x} \right) \) and \( \left( \frac{\partial z}{\partial y} \right) \), and the total derivative \( \left( \frac{dz}{dx} \right) \). How do the magnitudes \( (\Delta x) \) and \( (\Delta y) \) and \( (\Delta z) \) compare?

   Correct Answer: (c)

3. For the ideal gas equation of state \( (\frac{pV}{R}) = 1 \), which of the following is the correct expression for the compressibility factor \( Z \)?

   Correct Answer: (a)

4. Which one represents the stability of the thermodynamic system?  (1 point)
   a) \[ \left( \frac{\partial^2 S}{\partial P \partial V} \right)_T = 0 \]
   b) \[ \left( \frac{\partial^2 S}{\partial T \partial V} \right)_P = 0 \]
   c) \[ \left( \frac{\partial^2 S}{\partial T \partial V} \right)_P \neq 0 \]
   d) \[ \left( \frac{\partial^2 S}{\partial P \partial V} \right)_T \neq 0 \]

   Correct Answer: (b)

5. The isothermal compressibility \( (\alpha) \) of a stable thermodynamic system is

   a) \( \alpha > 0 \)
   b) \( \alpha < 0 \)
   c) \( \alpha = 0 \)

   Correct Answer: (a)

6. Which of the following relations is true?  (1 point)
   a) \[ C_v = -\left( \frac{\partial U}{\partial T} \right)_V \]
   b) \[ C_v = \left( \frac{\partial U}{\partial V} \right)_T \]
   c) \[ C_v = -\left( \frac{\partial S}{\partial T} \right)_V \]
   d) \[ C_v = \left( \frac{\partial U}{\partial T} \right)_V \]

   Correct Answer: (a)

7. Which of the following figure represents the Born diagram?  (1 point)

   Correct Answer: (a)