Math 233 - Quiz 8

October 26, 2023

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) Suppose you were given a function $w = f(x, y, z)$. Name two third-order mixed partial derivatives that you would expect to be equal, and state the condition(s) under which they will be equal.

$f_{xyz} = f_{yzx}$ IF THEY ARE BOTH CONTINUOUS ON A REGION AROUND (x, y, z)

2. (7 points) Use differentials to approximate the change in

$$T = \frac{2\pi\sqrt{L}}{\sqrt{g}} = 2\pi L^{1/2} g^{-1/2}$$

as (g, L) changes from $(32, 2.5)$ to $(32.03, 2.48)$.

$$dT = T_L\, dL + T_g\, dg = \pi L^{-1/2} g^{-1/2}\, dL + -\pi L^{1/2} g^{-3/2}\, dg$$

$$\Delta T \approx \frac{\pi}{\sqrt{Lg}}\Delta L - \frac{\pi\sqrt{L}}{\sqrt{g^3}}\Delta g, \quad \begin{matrix} L = 2.5 & \Delta L = -0.02 \\ g = 32 & \Delta g = 0.03 \end{matrix}$$

$$\Delta T \approx \frac{\pi}{\sqrt{(32)(2.5)}}(-0.02) - \frac{\pi\sqrt{2.5}}{\sqrt{(32)^3}}(0.03)$$

$$\approx \boxed{-0.00785}$$