

Taker Name:

Key

GTID: 90

Section:

Grader #1:

GTID: 90

§14.3: Partial Derivatives

Find the total derivative Df for the function below.

$$f(s, t) = \left\langle s^2 \sin(\pi t), \frac{e^{2t}}{s}, st \right\rangle$$

Total derivative Formula:

$$Df = \begin{bmatrix} x_s & x_t \\ y_s & y_t \\ z_s & z_t \end{bmatrix}$$

Components:

$$x(s, t) = s^2 \sin(\pi t)$$

$$y(s, t) = \frac{e^{2t}}{s}$$

$$z(s, t) = st$$

Basic derivatives

$$\frac{d}{ds} k s^2 = 2ks$$

$$\frac{d}{dt} k \sin \pi t = k\pi \cos \pi t$$

$$\frac{d}{ds} \frac{k}{s} = -\frac{k}{s^2}$$

$$\frac{d}{dt} k e^{2t} = 2k e^{2t}$$

$$\frac{d}{ds} ks = k$$

$$\frac{d}{dt} kt = k$$

$$So \quad Df = \begin{bmatrix} 2s \sin \pi t & s^2 \pi \cos(\pi t) \\ -e^{2t}/s^2 & 2e^{2t}/s \\ t & s \end{bmatrix}$$

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G2:

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G3:

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