Assume f(x) is a periodic function with period 2L, and has a Fourier series on the If 2 is the period of f(x) and n is any integer, then the period of f(x + 2n) is interval $-L \le x \le L$, then its Fourier series expansion formula is

- The domain of the function $f(x, y, z) = x ln\left(\frac{1}{2y-z}\right)$ is
- $\lim_{(x,y,)\to(0,\alpha)} \left(\frac{-y+x}{y^2-x^2}\right) =$
- Find the value of c such that the function $f'(x,y) = \frac{\left(e^{x^2+y^2}-1\right)}{x^2+y^2}$

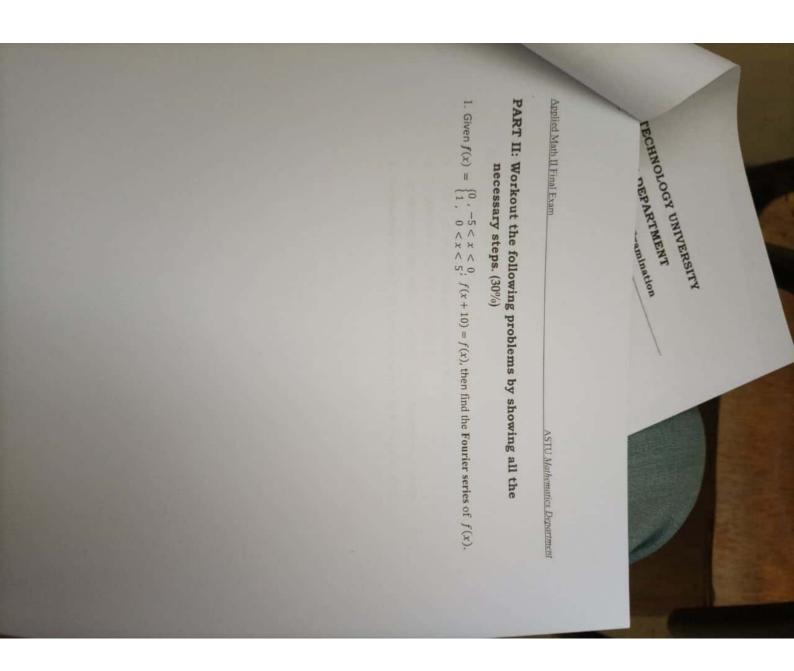
for $(x, y) \neq (0,0)$ is

for (x, y) = (0,0)

- continuous at (0,0). Answer: c =
- 7. Let $f(x, y) = xe^{xy}$, x = 3t, and y = 1. Given $z = x^2 \ln y$, then $\frac{\partial^2 z}{\partial y \partial x}$ at (2,2) is
- 9. If $R = \{(x, y): 0 \le x \le y, 0 \le y \le 1\}$, then $\iint e^{y^{-1}} dA =$ For $y^2(x^2 - 1) = zx^2$, by implicit differentiation $\frac{\partial z}{\partial y}$ at (1,1,0) =The equation of the tangent plane to the graph of f at a point (0,1,0) is

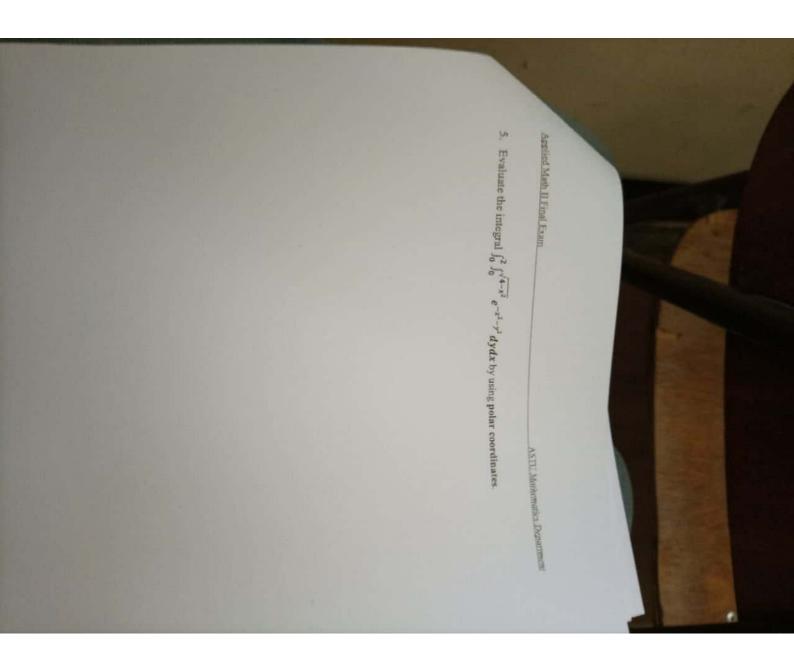
 $10. \int_0^{\pi} \int_0^{\sin\theta} r dr d\theta \theta =$

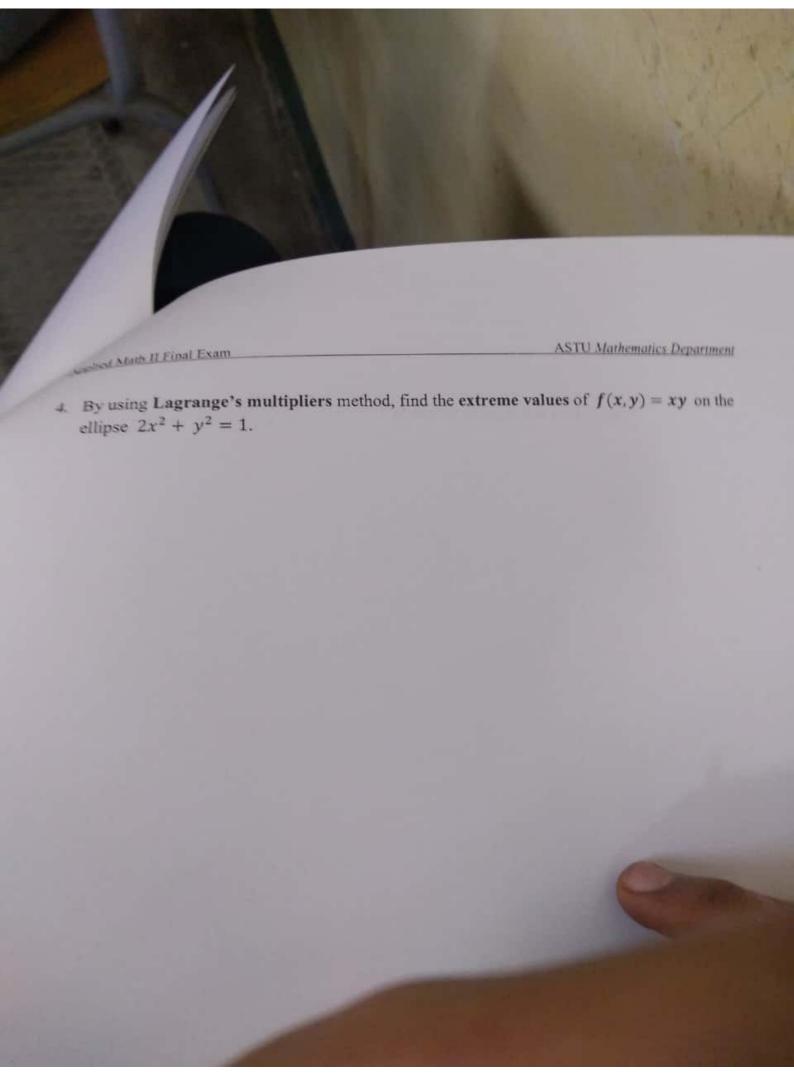
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PART II: Workout the following problems by showing all the necessary steps. (30%)

1. Given $f(x) = \begin{cases} 0, -5 < x < 0 \\ 1, 0 < x < 5 \end{cases}$; f(x+10) = f(x), then find the Fourier series of





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2. The temperature at a point (x, y) on a metal plate in the xy plane is given by

$$T(x,y) = \frac{xy}{2+x+y}$$
. Then find

- a. all first and second order partial derivatives of T at (1,1).
- b. the gradient vector, ∇T at the point (1,1).
- the directional derivative of T at p(1,1) in the direction of the vector v = i + j.
- d. the maximum value of the directional derivative at the point p(1,1).