

Problem 3. (10 pts)  $\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 + y^2}{xy} = \lim_{\pi \downarrow 0} \frac{\cancel{\pi^2}}{\cancel{\pi^2} \cos \theta \sin \theta}$

A.  $1/2$

B.  $0$

C.  $2$

D.  $1/(\cos \theta \sin \theta)$

E. None of the above

DNE

Problem 4. (10 pts)  $f(x, y) = x^2 e^{xy}$ . Use differentials and  $f(2, 0)$  to approximate  $f(1.9, 0.2)$ :

A.  $0.4$

B.  $-0.4$

C.  $0.1$

D.  $5.2$

E. None of the above

$$f(1.9, 0.2) = f(2, 0) + \Delta x \frac{\partial f}{\partial x}(2, 0)$$

$$+ \Delta y \frac{\partial f}{\partial y}(2, 0)$$

$$f(2, 0) = 4 \quad \frac{\partial f}{\partial x} = 2x e^{xy} + x^2 y e^{xy}$$

$$\frac{\partial f}{\partial x}(2, 0) = 4$$

$$\frac{\partial f}{\partial y} = x^3 e^{xy} \quad \frac{\partial f}{\partial y}(2, 0) = 8$$

So  $f(1.9, 0.2) = 4 - (0.1) \cdot 4 + (0.2) 8 = 5.2$