

Extra Practice Problems

Midterm 1 Math 225

1. Given the set $A = [0, 2) \cup (2, 3)$ in \mathbb{R} . Find

- (a) interior of A
- (b) exterior of A
- (c) boundary of A

2. Given the set $A = [0, 2) \cup (2, 3)$ in \mathbb{R} , is A

- (a) open
- (b) closed
- (c) open and closed
- (d) neither open nor closed?

Explain your answers!

3. Given $f : \mathbb{R}^2 \rightarrow \mathbb{R}$ defined by $f(x, y) = 2x^2y^4 + 7x^3y$ and $g : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined by $g(s, t) = (g_1(s, t), g_2(s, t))$ where $g_1(s, t) = s \cos t$ and $g_2(s, t) = \sin(t^2) + 2s$. Define $F : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ by $F(s, t) = f(g(s, t))$.

- (a) Find the Jacobian matrix of Df
- (b) Find the Jacobian matrix of Dg
- (c) Using the chain rule we know $DF(s, t) = Df(g_1(s, t), g_2(s, t))Dg(s, t)$. Using the matrix multiplication find
 - i. $\frac{\partial F}{\partial s}$
 - ii. $\frac{\partial F}{\partial t}$