MATH 2D Prep: Differentiation Techniques

Facts to Know:

1. Chain Rule: Two notations:

   (a) $\frac{d}{dx}[f(g(x))] =$

   (b) If $y =$ _____ , $u =$ _____ , then $\frac{dy}{dx} =$

2. Product Rule: $\frac{d}{dx}[f(x)g(x)] =$

Examples:

1. Use the chain rule to find the derivative of $F(x) = \sin(x^2)$

   - Method 1: use notation same as in (a):

     $f(u) =$ _____ $g(x) =$ _____ , $f'(u) =$ _____ $g'(x) =$ _____ ,

   - Method 2: use notation same as in (b):

     $y =$ _____ $u =$ _____ , $\frac{dy}{du} =$ _____ $\frac{du}{dx} =$ _____ ,

2. Find the derivative of $G(x) = x^3 \sin(x^2)$

   $f(x) =$ _____ $g(x) =$ _____ , $f'(x) =$ _____ $g'(x) =$ _____ ,