MAT3-121 Calculus of a Single Variable

Quiz 4 November 11, 2016

Solution

name

You must either justify your answers and/or show your work. Don't approximate your answers unless directed to do so. No calculators are allowed.

1. (4 pts.) Find the derivative of the following functions:

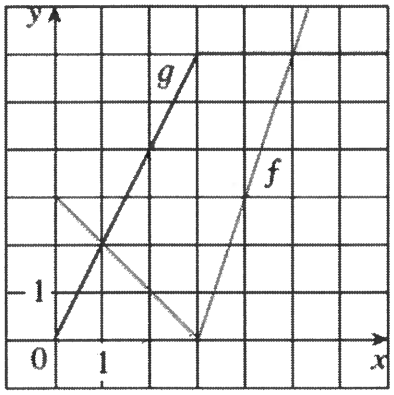
a. $f(x) = [\cos(\ln(x))]^4$

$4[\cos(\ln x)]^3 \cdot -\sin(\ln x) \cdot \frac{1}{x}$

b. $g(x) = \sqrt{1-x^2}$

$\frac{-2x}{2\sqrt{1-x^2}} = \frac{-x}{\sqrt{1-x^2}}$

2. (2 pts.) Graphs of functions f and g are at the right. Let $c(x) = f(g(x))$. Find $c'(2)$. Show your work.



$f'(g(2)) \cdot g'(2) = f'(4) \cdot 2$

$= 3 \cdot 2 = 6$

3. (4 pts.) Use implicit differentiation to find the equation of the tangent line to the graph of $2(x^2+y^2)^2 = 25xy$ at the point (1,2).

$4(x^2+y^2) \cdot (2x + 2yy') = 25y + 25xy'$

$(4(x^2+y^2)(2y) - 25x)\, y' = 25y - 8x(x^2+y^2)$

$y' = \frac{25y - 8x(x^2+y^2)}{4(x^2+y^2)2y - 25x}$

$y'|_{(1,2)} = \frac{50 - 8(5)}{4(5)\cdot 4 - 25} = \frac{10}{55} = \frac{2}{11}$

$y = mx + b$

$2 = \frac{10}{55} \cdot 1 + b \quad b = \frac{100}{55} = \frac{20}{11}$

$y = \frac{2}{11}x + \frac{20}{11}$