

MAT128 Test 2 (Fall 2015): Derivative Functions and Differentiation Rules

Name:

Directions: All problems are equally weighted. Show your work! Answers without justification will likely result in few points. Your written work also allows me the option of giving you partial credit in the event of an incorrect final answer (but good reasoning). Indicate clearly your answer to each problem (e.g., put a box around it).

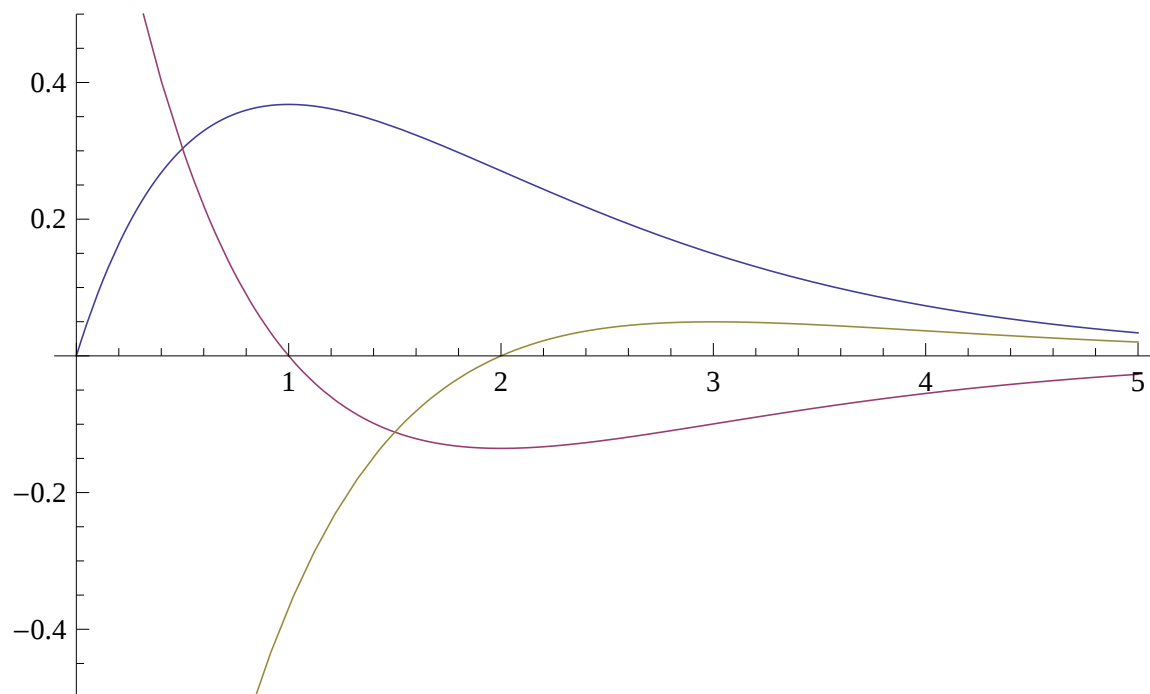
Good luck!

Problem 1 (20 pts). Use the limit definition of the derivative of a function to find the derivative of

$$f(x) = \frac{1}{x}$$

Justify your steps.

Problem 2 (15 pts). For the following graphs, determine which is the function f , which the derivative f' , and which the second derivative f'' . Give reasons for your choices: no reasons, no points.



Problem 3 (30 pts). For each of the following functions, find the derivative. Show your work, and make obvious simplifications in your answers.

a. $f(x) = (x^2 - 1)^2(x^3 + x)^2$

b. $f(x) = \cos(x) + x \sin(x)$

c. $f(x) = \frac{x - 1}{x + 1}$

Problem 4 (20 pts). Demonstrate the chain rule to find the derivative of $F(x) = \sqrt{x^2 + \sin(x)}$. Write F explicitly as a composition of two functions, f and g .

Problem 5 (15 pts). Find the equation of the tangent line to the function $f(x) = \cos(\pi x)$ at $x = \frac{1}{4}$.