

Math 1271-70 (Calculus 1). Fall 2014.

Practice Midterm 2

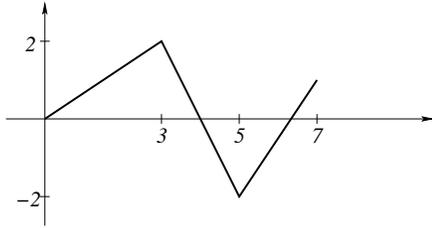
Name: _____

TA: _____

Section: _____

1. **Do not open this exam until you are told to do so.**
2. This exam has 6 pages including this cover. There are 5 problems.
3. Not all problems are of equal difficulty, so you may want to skip over and return to a problem on which you are stuck.
4. Do not separate the pages of this exam. If they do become separated, write your name on every page and point this out to your instructor when you hand in the exam.
5. Show an appropriate amount of work for each problem.
6. You may (but do not need to) use a scientific calculator.
7. No notecards are allowed.
8. **No cell phones, smartphones, headphones, or other devices allowed.**

Problem 1. (10 points) Given below are the graph of a function $f(x)$ and the table for a function $g(x)$.



x	0	1	2	3	4
$g(x)$	4	3	1	2	$\frac{20}{3}$
$g'(x)$	-2	$-\frac{5}{2}$	$\frac{1}{2}$	3	$-\frac{1}{3}$

Calculate the following. (NPC)

a. (2 points) $\frac{d}{dx} (f(g(x)))$ when $x = 0$.

Answer: _____

b. (2 points) $\frac{d}{dx} (g(f(x)))$ when $x = 3$.

Answer: _____

c. (2 points) $\frac{d}{dx} (f(x)g(x))$ when $x = 2$.

Answer: _____

d. (2 points) $\frac{d}{dx} \left(\frac{f(x)}{g(x)} \right)$ when $x = 4$.

Answer: _____

e. (2 points) $\frac{d}{dx} (f^{-1}(x))$ when $x = 1$.

Answer: _____

Problem 2. (10 points) A curve in the plane is given by the equation $\sin(\pi xy) = y - 1$.

a. (2 points) Check that the point $(1, 1)$ lies on this curve.

b. (8 points) Find the equation of the tangent line to the curve at $(1, 1)$.

Answer: _____

Problem 3. Let $y = ax^b \ln(x)$, for some nonzero constants a, b .

a. (3 points) Calculate $\frac{dy}{dx}$ in terms of a and b .

Answer: $\frac{dy}{dx} =$ _____

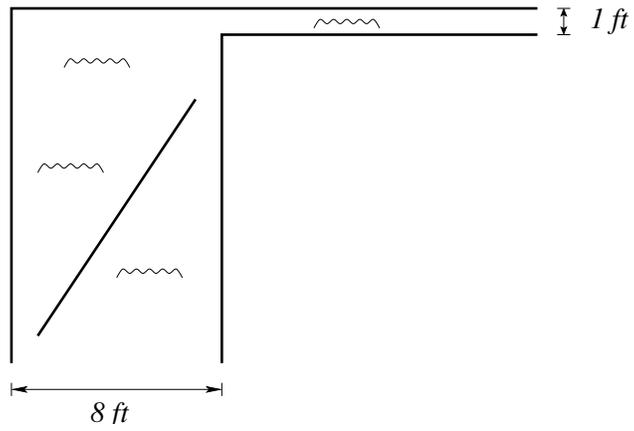
b. (7 points) Find the values of a and b for which the function has a local maximum at $(e, 1)$. Check that the function indeed has a local maximum at $(e, 1)$.

Answer: $a =$ _____ $b =$ _____

Problem 4. A person walks out of point A at noon and heads north at a speed of 1 mph. Three hours later, another person runs out of A and heads east at 6 mph. At what rate is the distance between the two people increasing at 4pm?

Answer: _____

Problem 5. A wooden rod is floating toward a bend in the channel shown below. What is the maximal possible length of the rod that will get through?



Answer: _____