

Math 201 Test 2B
December 11, 2019

Name: _____

Note that both sides of each page may have printed material.

If you could read the directions
before asking me a question



Instructions:

1. Read the instructions.
2. Panic!!! Kidding, don't panic! I repeat, **do NOT panic!**
3. Complete all problems in the actual test. Bonus problems are optional. Point values are indicated.
4. **You have 1 hour to complete the test.**
5. Show ALL your work to receive full credit. You will get 0 credit for simply writing down the answers (unless it's a case of fill in the blank or state a definition, etc.)
6. Write neatly so that I am able to follow your sequence of steps and box, or otherwise indicate, your answers. Solutions with no indicated answer or several contradictory answers will be considered incorrect.
7. Read through the exam and complete the problems that are easy (for you) first!
8. Don't commit any of the blasphemies mentioned in the syllabus!
9. You are NOT allowed to use notes, calculators, or other aids—including, but not limited to, divine intervention/inspiration, the internet, telepathy, knowledge osmosis, the smart kid that may be sitting beside you or that friend you might be thinking of texting.
10. In fact, **cell phones should be out of sight! If you are caught with a cellphone you will be asked to leave the exam and you'll be given a zero. That goes for smart watches too!**
11. Use the correct notation and write what you mean! x^2 and $x2$ are not the same thing, for example, and I will grade accordingly.

when, like society, jhevon's class kicks u down



but ur glad ur almost done

Hopefully you'll have cause for celebration in the end. Good luck!

1. Compute the following integrals (5 points each):

$$(a) \int \frac{x^2 \sec x \tan x - 2x + \sqrt{x}}{x^2} dx$$

$$(b) \int e^{\sin x} \cos x dx$$

$$(c) \int \frac{7dx}{(2-3x)^2}$$

$$(d) \int_0^{\ln 3} \frac{e^x}{3e^x - 1} dx$$

2. (15 points) A container with a square base has a volume of 16 cubic inches. If the material for the base costs \$4 per square inch, the material for the sides cost \$3 per square inch, and the material for the top costs \$2 per square inch, find the dimensions of the box that minimize the cost of the materials to make the box.

3. (a) (10 points) Jhevon's gradebook is dropped off the side of a building. It hits the ground after 4 seconds. How tall is the building? Neglect air resistance and all other factors, treat this as a freefall problem and use calculus to solve it.

(b) (10 points) If $F(x) = \int_{\sqrt{x}}^{1-x^3} \frac{\cos t}{t-1} dt$, find $F'(x)$.

4. (5 points) Use linear approximation to estimate $\cos\left(\frac{\pi}{2} - 0.01\right)$. Simplify your answer.

5. (a) (4 points—all or nothing) State the Mean Value Theorem, including the hypotheses.

(b) (8 points) Find the value(s) of c guaranteed by the Mean Value Theorem for the function $f(x) = x^3 - 3x + 2$ on the interval $[-2, 1]$.

(b) (8 points) Find the absolute extrema of the function $f(x)$ on the given interval.

6. Consider the function $f(x) = 4 - x^2$ on the interval $[0,2]$.

(a) (10 points) Use a finite Riemann sum with four equal subintervals and right-hand endpoints to approximate the area under $f(x)$ on the interval. You may leave your answer as an unsimplified sum of terms.

(b) (10 points) Compute the exact area under $f(x)$ on the interval by using the limit at infinity of a Riemann sum.



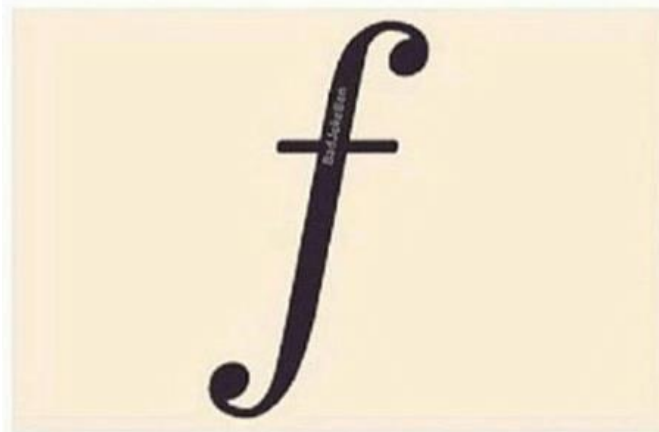
Bonus Problems: 10 points each. (You must complete all problems in the actual test to be eligible).
Show your work!

1. Compute the area bounded between the curves $y = -x^2$ and $y = x^2 - 4x$. Include a sketch of the bounded region.

2. A cylindrical tank with radius 4 inches is being filled with water at a rate of 3 cubic inches per minute. How fast is the height of the water increasing?

Me after test 2: Can you curve my grade?

Jhevon:



I'm kidding!!! I'm sure you all did well!

We're almost at the finish line!