

Math 201 Test 2 Review 1

December 5, 2019

Name: _____

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

Instructions:

1. Read the instructions.
2. Panic!!! Kidding, don't panic! I repeat, **do NOT panic!** Don't look down, while you're at it.
3. Complete all problems in the actual test. Bonus problems are, of course, optional. And they will only be counted if all other problems are attempted.
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.
6. Write neatly so that I am able to follow your sequence of steps and box your answers.
7. Read through the exam and complete the problems that are easy (for you) first!
8. Scientific calculators are allowed, but you are NOT allowed to use notes, graphing 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.
9. In fact, **cell phones should be out of sight!**
10. 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.
11. Other than that, have fun and good luck!

May the force be with you. But you can't ask it to help you with your test.

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

$$(a) \int \frac{x^2 - 3x + 4}{x^2} dx$$

$$(b) \int \frac{e^{\sin^{-1} x}}{\sqrt{1-x^2}} dx$$

$$(c) \int \tan x \ln(\cos x) dx$$

$$(d) \int_0^{\pi/4} 2 \cos^2 2x - 1 \, dx$$

2. (15 points) A storage shed is to be built in the shape of a box with a square base. It is to have a volume of 300 cubic feet. The base is concrete and costs \$8 per square foot, the roof is made of a metal that costs \$4 per square foot, and the material for the sides costs \$5 per square foot. Find the dimensions of the most economical shed.

3. (a) (10 points) A moving particle has an acceleration of $a(t) = 3t^3$. If its initial velocity is $v(0) = 1$ and its initial position is $s(0) = 0$, find the position function of the particle.

Does the particle ever change direction?

(b) (10 points) Compute $\frac{d}{dx} \int_x^{3x^3} \sqrt[3]{1+t^3} dt$

4. (5 points) Use linear approximation to approximate $\sqrt{35.5}$.

5. (a) (10 points) Find the value(s) of c guaranteed by the Mean Value Theorem for the function $f(x) = x(x^2 - x - 2)$ on the interval $[-1, 1]$.

What conditions allowed you to apply the Mean Value Theorem here?

- (b) (10 points) Find the absolute extrema of the function $f(x) = 3x^4 - 4x^3$ on $[-1, 2]$.

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

(a) (10 points) Use a finite Riemann sum with three equal subintervals and left-hand endpoints to approximate the area under $f(x)$ on the interval.

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

