Math 1432 Review For Test 2

Reserve a seat for Test 2. Double check your time

Be at the testing center on time! If you’re too late, then they won’t let you in.

Take practice test 2.

Review sheet posted on course website; make sure you can solve all questions on that sheet.

Number of Questions: 10+bonus

Multiple Choice: 6, Free Response: 4, plus BONUS

The grade you see right away after taking the exam will be for the multiple choice part only (6x7=42 points). FR part will be graded later and the grade for it will be posted separately.

Time: 50 minutes

Remember the make up policy: No make ups. If you miss the test, try to reschedule online. If you can’t find any seats, you will receive 0 in this test, final will replace ONE missed test (or the lowest test if you don’t miss any tests).

No calculators; study accordingly.

Topics: Sections 7.1 – 7.7.

-Integration

-Average Value

-Finding the area of a region.

-Finding the volume of solids (with given cross sections and of revolution)

-Disk/Washer, Shell Methods.

-Finding arc length, surface area, centroid. Pappus’s Theorem.

-Differential Equations, Exponential Growth/Decay.

-Improper Integrals

How to study:

Solve the problems on the review sheet posted on CASA AND all problems on today’s notes; take practice test 2, go over past quizzes and HW, study class notes.
Example: Let \( f \) be a positive function. The area bounded by \( f(x) \) and the x-axis from \( x=1 \) to \( x=5 \) is \( \frac{21}{5} \). Find the **average value** of this function.

Example: (From Quiz 3)
Example: a) Find the area of the region bounded by \( f(x) = 2\sqrt{x} \) and \( g(x) = \frac{1}{4}x^2 \).

Exercise: b) Find the centroid of the region in (a).
Example: Let R be the region in the first quadrant bounded by $f(x) = 3 - x^2$ and $g(x) = 2x$.

Set up the formulas that will give the volume of the solid formed when R is rotated
a) about the x-axis.

b) about the y-axis.

Shell method:

Disk/washer method:
c) If R is the base of a solid such that the cross sections perpendicular to x-axis are squares, set up the formula for the volume of that solid.

Example: Set up the formula that gives the **arc length** of the following curve:

\[
f(x) = \frac{2}{3} (x-1)^{3/2}, \quad x \in [1,2]
\]

Example: The region bounded by \( f(x) = x^3 \) and \( y=0, \ 0 \leq x \leq 1 \), is rotated about the x-axis. Set up the formula that gives the surface area of the solid formed.

(Exercise: Compute the surface area.)
Example: Given that the centroid of a region is (6,8) and its area is 1/2, find the volume of the solid formed when this region is rotated about the line y=20. (Assume that the region does not contain the line y=20.)

Example: Solve

\[
y' = \frac{xy + 4y}{y^3 + 2}
\]
Exercises: Solve

\[ y' = \frac{xy^2 - 10y^2}{(y + 1)} \]

(Solve all problems on the review sheet on CASA!).

Example: Given that 10% of a radioactive substance decays in 5 years, give a formula for the amount of substance in terms of \( t \) if the initial amount is 100 grams.

Exercise: The population of a bacteria culture increases by 20% in 10 hours. What is the population in 24 hours if the initial population is 1000?
This example is from the review sheet; check your answers from the key. We may not have time to solve all of them in class.

**Example:** Determine if each integral is improper. If it is improper, state why, rewrite it using proper limit notation, and solve.

a. \[ \int_{0}^{27} x^{-2/3} \, dx \]

b. \[ \int_{0}^{4} \frac{1}{\sqrt{4-x}} \, dx \]

c. \[ \int_{1}^{9} (x-1)^{2/3} \, dx \]

d. \[ \int_{0}^{4} \frac{e^{\sqrt{x}}}{\sqrt{x}} \, dx \]

e. \[ \int_{0}^{1} \frac{1}{e^x} \, dx \]

f. \[ \int_{1}^{4} \frac{1}{(x-2)^{1/3}} \, dx \]

g. \[ \int_{-\infty}^{\infty} \frac{1}{1+x^2} \, dx \]

h. \[ \int_{2}^{5} (x-1)^{-1/2} \, dx \]

i. \[ \int_{1}^{\infty} \frac{1}{(x+4)^3} \, dx \]