

Mini-Test #3 (v1) — Math 151 — Calculus II — Spring 2021

You have **ONE hour** (+ 10 mins) to submit your answers for this mini-test. Please strictly adhere to the following instructions:

- (1) Write a **FULL** solution for **each** problem on a *separate* piece of paper. You need to use the methods that were taught in class and you need to show how you arrived to your answer. Failing to provide all the details on how you arrived to your answer will be deemed as suspicious and you risk being subject to disciplinary actions (in addition of getting an F in the whole test).
- (2) Start each solution, on a *separate* piece of paper, by writing the question number. Write clearly/neatly and **BOX your final answers**. If you do not box your final answer, your answer will NOT be graded or you will get points deducted!
- (3) When you are ready to submit, and **no later than 60 minutes after the start of the test**, collect all your answers into a **single PDF** and upload by **matching** the different pages of your PDF to the questions in the test. Each failure to match the correct problem will incur a point deduction.
- (4) If the problem includes a figure: please reproduce the figure carefully so that you can use it to solve the question.
- (5) Make sure to always upload pics/images that are not blurry and that are oriented correctly (an upside down or blurry pic earns NO points. Seriously!).
- (6) Only use techniques that were taught in class and make sure that all of your answers are accompanied by their respective explanations. **No full work shown = no points.**
- (7) Use the method indicated in each problem. Failure to do so earns no points.

Here is an honor pledge that you need to sign and date. Failure to sign will automatically result in a zero for this test:

Question#1. HONOR PLEDGE:

- (A) The material that I am uploading is **completely my own work**, and that I did not take, borrow, or copy any portions from ANY other sources. This includes, but it is not limited to, NOT using any of the following resources: calculator, internet [Chegg, Slader, WolframAlpha, IntegralCalculator, WhatsApp, Instagram, etc], cellphone, computer, roommate, friend, tutor, etc...
- (B) I will **NEVER** post/share/send/upload/download (**DURING** or **AFTER** the test) **ANY** portions of this test to/from the internet or any other type of platform.
- (C) I will **stop solving the test after 60mins** and will use the last 10mins for uploading. **It is MY responsibility to upload before the time runs out.** If I run out of time I will NOT contact the calc team for help.

I understand if I violate this honesty pledge, I will earn an F for the whole semester and I will be subject to disciplinary actions pursuant to the appropriate sections of the San Diego State University Policies.

WRITE BELOW:

"I have read and understood all of the above points." and then write your name, sign, write your RedID, your section number, professor, and date:

I _____

First/last name

Signature

RedID

Sec.#

Professor

date

2. (3 pts) Linear Differential Equations:

[SDSU M151 S21 MiniTest3 V1 Q2 9/Apr/2021 5:00-6:10pm PDT — Do NOT share/distribute/post/upload]

[Remember to **stop** solving and **submit** when there are **10 mins** (or more) left on the clock!!! No late submissions!]

(a) Give first GENERAL solution and then (b) the PARTICULAR solution satisfying the initial condition.

$$\frac{dy}{dx} - Ay - 2e^{Ax} = 0 \text{ with } y(0) = 5, \text{ where } A \text{ is a constant.}$$

(a) General solution: $y(x) =$

(b) Particular solution: $y(x) =$

[extra (+1 pts)]: Verify that the **general** solution you found does indeed solve the differential equation:

3. (3 pts) Application of Series:

[SDSU M151 S21 MiniTest3 V1 Q3 9/Apr/2021 5:00-6:10pm PDT — Do NOT share/distribute/post/upload]
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Assume you have a savings bank account that initially contains M_0 dollars. At the end of each year, you deposit a constant amount of D dollars into the account. The savings account yields a **5%** gains every year.

(a) Compute, as function of M_0 and D , the dollar amount that you will have after **one year** (M_1), **two years** (M_2), and **three years** (M_3):

$$M_1 =$$

$$M_2 =$$

$$M_3 =$$

(b) From the pattern above, write M_n (dollar amount after n years) as a function of M_0 and D , for general n using the sum (Σ) notation. Be clear about which terms are INSIDE the sum and which ones are OUTSIDE of the sum!

(c) Rewrite M_n using the following partial geometric sum: $\sum_{i=0}^{n-1} b r^i = b \frac{r^n - 1}{r - 1}$.

4. (3 pts) Determine whether the following infinite series converge or diverge USING THE INDICATED TEST. Make sure to **STATE** and **CHECK** that **ALL** test conditions are satisfied. **No detailed explanations** → **no points!!!**
[SDSU M151 S21 MiniTest3 V1 Q4 9/Apr/2021 5:00-6:10pm PDT — Do NOT share/distribute/post/upload]
[Remember to **stop** solving and **submit** when there are **10 mins** (or more) left on the clock!!! No late submissions!]

$$S_1 = \sum_{n=2}^{\infty} \frac{4}{n^{3/2} + 5 \ln(n)} \quad (\text{Direct comparison [sandwich] test}). \quad [\text{Hint: } \ln(2) > 0]$$

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5. (3 pts) Determine whether the following infinite series converge or diverge USING THE INDICATED TEST. Make sure to **STATE** and **CHECK** that **ALL** test conditions are satisfied. **No detailed explanations** → **no points!!!**
[SDSU M151 S21 MiniTest3 V1 Q6 9/Apr/2021 5:00-6:10pm PDT — Do NOT share/distribute/post/upload]
[Remember to **stop** solving and **submit** when there are **10 mins** (or more) left on the clock!!! No late submissions!]

$$S_2 = \sum_{n=1}^{\infty} \frac{5}{\sqrt{3n+2}} \quad (\text{Integral test})$$

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6. (3 pts) Determine whether the following infinite series converge or diverge USING THE INDICATED TEST. Make sure to **STATE** and **CHECK** that **ALL** test conditions are satisfied. **No detailed explanations** → **no points!!!**
[SDSU M151 S21 MiniTest3 V1 Q7 9/Apr/2021 5:00-6:10pm PDT — Do NOT share/distribute/post/upload]
[Remember to **stop** solving and **submit** when there are **10 mins** (or more) left on the clock!!! No late submissions!]

$$S_3 = \sum_{n=1}^{\infty} \frac{2^n + 3}{5^n - 2} \quad (\text{Limit comparison test})$$

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7. (3 pts) Using the **RATIO test**, determine the **radius** AND the **interval** of convergence of the following infinite series. **Do NOT study convergence at the end points.** Explain what you are doing and show all your work!
[SDSU M151 S21 MiniTest3 V1 Q9 9/Apr/2021 5:00-6:10pm PDT — Do NOT share/distribute/post/upload]
[Remember to **stop** solving and **submit** when there are **10 mins** (or more) left on the clock!!! No late submissions!]

$$S_4 = \sum_{n=0}^{\infty} (-1)^n \frac{n^2}{5^n} (2x - 3)^n$$

Radius of conv.:

Interval of conv.:

$< x <$

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8. (3 pts) Application of Series:

[SDSU M151 S21 MiniTest3 V1 Q11 9/Apr/2021 5:00-6:10pm PDT — Do NOT share/distribute/post/upload]

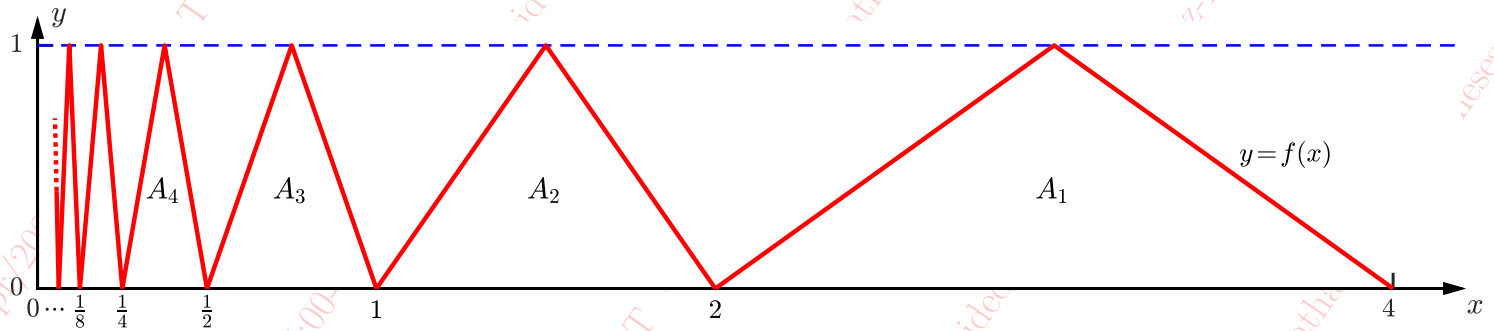
[Remember to **stop** solving and **submit** when there are **10 mins** (or more) left on the clock!!! No late submissions!]

Using series, evaluate the integral $I_1 = \int_0^4 f(x) dx$, where f is the function whose graph is shown below.

Hints:

(i) The area of a triangle is $\frac{1}{2}(\text{base} \times \text{height})$.

(ii) Compute the areas A_1, A_2 , etc..., find a pattern and sum them up!



$I_1 =$

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9. (2 pts) Series:

[SDSU M151 S21 MiniTest3 V1 Q11 9/Apr/2021 5:00-6:10pm PDT — Do NOT share/distribute/post/upload]
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Suppose we have a sequence $\{a_n\}_{n=1}^{\infty}$ such that $\lim_{n \rightarrow \infty} n a_n = 3$.

Using the **Limit Comparison Test**, by comparing with the appropriate sequence, perform the following tasks:

(a) Determine whether the infinite series $\sum_{n=1}^{\infty} a_n$ converges or diverges.

(b) Determine whether the infinite series $\sum_{n=1}^{\infty} a_n^2$ converges or diverges.

EXTRA CREDIT (2 pts) For what values of k does the following series converge?
[Hint: Use the **integral test** and remember that $\ln(2) > 0$]

$$\sum_{n=2}^{\infty} \frac{1}{n (\ln n)^k}$$

[SDSU M151 S21 MiniTest3 V1 Q11 9/Apr/2021 5:00-6:10pm PDT — Do NOT share/distribute/post/upload]
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