Name: ______________________________ EMPLID: ______________

1. (5 points) Evaluate $\int_0^1 \frac{x}{(2x+1)^3}\,dx$.

1. ____________

2. (5 points) Evaluate $\int_{-\infty}^0 2te^t\,dt$.

2. ____________

3. (5 points) Determine whether the sequence $a_n = \cos\left(\frac{n\pi}{n+1}\right)$ converges or diverges. If it converges, find the limit.

3. ____________

4. (5 points) Let $a_n = \frac{2n}{3n+1}$. Which of the following are true.

   A. $\{a_n\}$ is a convergent sequence and $\sum_{n=1}^{\infty} a_n$ converges.

   B. $\{a_n\}$ is a convergent sequence and $\sum_{n=1}^{\infty} a_n$ diverges.

   C. $\{a_n\}$ is a divergent sequence and $\sum_{n=1}^{\infty} a_n$ converges.

   D. $\{a_n\}$ is a divergent sequence and $\sum_{n=1}^{\infty} a_n$ diverges.

4. ____________

5. (5 points) (True/False) If $\sum a_n$ is divergent then $\sum |a_n|$ is divergent.

5. ______________

6. (5 points) Determine if the sequence $\sum_{n=1}^{\infty} \frac{e^{2n}}{6^{n-1}}$ is convergent or divergent. If it is convergent, find its sum.

6. ______________

7. (5 points) Determine if the series $\sum_{k=2}^{\infty} \frac{1}{k \ln k}$ is convergent or divergent. State the test you used.

7. ______________

8. (5 points) Determine if the series $\sum_{k=1}^{\infty} \frac{k \sin^2 k}{1+k^3}$ converges or diverges. State the test you used.

8. ______________

9. (5 points) Determine if the series $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^2+1}}$ converges or diverges. Justify your answer.

10. (5 points) (True/False) The series $\sum_{n=1}^{\infty} (-1)^n \frac{n^4}{3^n}$ is absolutely convergent.

11. (5 points) Which of the following are true statements about the series $\sum_{n=1}^{\infty} \frac{-n}{n^2+1}$.

    A. The series is absolutely and condititionally convergent.

    B. The series is condititionally covergent but not absolutely convergent.

    C. The series is absolutely covergent but not condititionally convergent.

    D. The series is absolutely and condititionally divergent.

11. ______________

12. (5 points) Use the midpoint rule with $n = 4$ to evaluate $\int_0^2 \sqrt{1 + x^3}\, dx$. Do not simplify your answer.

12. ______________

13. (5 points) (True/False) the series $\sum_{n=1}^{\infty} \frac{n!}{100^n}$ is absolutely convergent.

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