

4. (10 pts) Consider the region R bounded by the coordinate axes, the line $x = 1$, and the curve $y = e^{-x^2}$. What is the volume of the solid obtained by rotating R around the y -axis?

5. (10 pts) Evaluate the indefinite integral

$$\int x^2 \sqrt{1 - x^2} dx.$$

You may use the identity $\sin 2u = 2 \sin u \cos u$.

6. (10 pts) Evaluate the definite integral

$$\int_0^1 \frac{x+1}{e^{2x}} dx.$$

7. (10 pts) Does the series $\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\log n}}$ converge or diverge?

8. (10 pts) Does the series $\frac{1}{1} + \frac{1}{11} + \frac{1}{111} + \frac{1}{1111} + \cdots$ converge or diverge?

9. (10 pts) Does the series $\sum_{n=0}^{\infty} \frac{(-1)^{nn}}{4n^2-9}$ converge, and if so, does it converge absolutely?

10. (10 pts) Find the area of the plane region bounded by the curves $y = x^2 + 1$ and $y = \frac{4}{x^2+1}$.

11. (20 pts) Give the expansion of $\frac{x}{\sqrt{1+x^2}}$ as a power series in x , up to and including the x^7 term.

12. (20 pts) Give the radius of convergence and the interval of convergence of

$$\sum_{n=1}^{\infty} \frac{(x-3)^n}{n2^n}.$$

13. (20 pts) Give the radius of convergence and the interval of convergence of

$$x + 3x^3 + 5x^5 + 7x^7 + 9x^9 + \dots$$

14. (20 pts) Give the expansion of $e^{x^4} \cos(x^2)$ as a power series in x out to and including the x^8 term.

15. (20 pts) Give the Taylor series for $\frac{1}{x}$ around $a = 1$. You do not need to use \sum notation but should either write down the form of the general term or write down enough terms to make the pattern clear.