

All numbered problems are worth ten points except problem 9, which is worth 20 points. You must get at least 90 points to pass.

1. $\int \frac{x^2 - 2}{(x^3 - 6x + 5)^2} dx =$

2. $\int_0^4 \frac{1}{1 + \sqrt{x}} dx =$ Use $x = (u - 1)^2$.

3. $\int x \cos(2x) dx =$

4. a) $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2} =$ b) $\lim_{x \rightarrow \infty} \frac{2^x}{3^x} =$

5. $\int_0^{\infty} e^{-2x} dx =$

6. $2 - \frac{2}{3} + \frac{2}{9} - \frac{2}{27} + \dots =$

7. Find the interval of convergence of $\sum_{k=0}^{\infty} 5^k x^k$ except for the endpoints.

8. Find the power series expansion about $x = 0$ of the function $f(x) = \frac{e^x + e^{-x}}{2}$.

9. For each of the following series state whether it

A) converges absolutely, B) converges conditionally, or C) diverges.

You do not need to justify your answers.

a) $\sum_{k=0}^{\infty} \frac{k+1}{k!}$

c) $\frac{1}{2} - \frac{2}{3} + \frac{3}{4} - \frac{4}{5} + \frac{5}{6} - \dots$

b) $\sum_{k=0}^{\infty} \frac{1}{3 + 2^k}$

d) $\sum_{k=1}^{\infty} (-1)^k \frac{\sqrt{k^3 + 4k^2 - 3}}{k^2 + 3k + 8}$