WIR 6

Problem 1. Compute $\int_{x=3}^{\infty} \frac{dx}{(x-2)^{3/2}}$.

Problem 2. Compute $\int_{x=-\infty}^{0} \frac{dx}{3-4x}$.

Problem 3. Compute $\int_{x=0}^{\infty} te^{-t}$.

Problem 4. Compute $\int_{x=2}^{\infty} \frac{dx}{x^2+2x-3}$.

Problem 5. What power does r need to be for the integral $\int_{t=1}^{\infty} \frac{dt}{t^r}$ to converge?

Problem 6. What power does r need to be for the integral $\int_{t=1}^{\infty} \frac{\ln t dt}{t^r}$ to converge?

Problem 7. Does the integral $\int_{t=e}^{\infty} \frac{dt}{t(\ln t)^r}$ converge for any value of r?

Problem 8. Determine whether the integral $\int_{t=1}^{\infty} \frac{dt}{t^2-1}$ converges.

Problem 9. Determine whether the integral $\int_{t=1}^{\infty} \frac{dt}{t+1}$ converges.

Problem 10. Determine the values of r for which the integral $\int_{t=0}^{\infty} \frac{dt}{t^r(t+1)}$ converges.

Problem 11. Determine whether the following sequence converges. If it does, find its limit: $a_k = \frac{3+5k^2}{k+k^2}$.

Problem 12. Determine whether the following sequence converges. If it does, find its limit: $a_k = \frac{3+5k^2}{k+k^2}$.

Problem 13. Determine whether the following sequence converges. If it does, find its limit: $a_k = \frac{3\sqrt{n}}{\sqrt{n}+2}$.

Problem 14. Determine whether the following sequence converges. If it does, find its limit: $a_k = \cos\frac{k\pi}{k+1}$.

Problem 15. Determine whether the following sequence converges. If it does, find its limit: $a_k = f(\frac{1}{k})$. Here, $f(x) = \begin{cases} x, & x \leq 0 \\ 1+x, & 0 < x \end{cases}$.

Problem 16. Determine whether the following sequence converges. If it does, find its limit: $a_k = f(\frac{(-1)^k}{k})$. Here, $f(x) = \begin{cases} x, & x \leq 0 \\ 1+x, & 0 < x \end{cases}$.

Problem 17. Determine whether the following sequence converges. If it does, find its limit: $a_k = \ln(k+1) - \ln(k)$.

Problem 18. Determine whether the following sequence converges. If it does, find its limit: $a_k = \sqrt{k+1} - \sqrt{k}$.

Problem 19. Determine whether the following sequence converges. If it does, find its limit: $\{\sqrt{2}, \sqrt{2\sqrt{2}}, \sqrt{2\sqrt{2\sqrt{2}}}, \ldots\}$.

Problem 20. Determine whether the following sequence converges. If it does, find its limit: $a_1 = 1$ and $a_k = 3 - \frac{1}{a_{k-1}}$.