

- Q1. (a) Find $\lim_{x \rightarrow -3} \frac{x+3}{x^2+4x+3}$
- (b) At what point(s) the function $y = \frac{x+1}{x^2-4x+3}$ is continuous?
- Q2. (a) Using the product rule find $\frac{dy}{dx}$ if $y = \left(x + \frac{1}{x}\right)\left(x - \frac{1}{x} + 1\right)$
- (b) Using the product rule find $\frac{dy}{dx}$ if $y = \frac{\sqrt{x}-1}{\sqrt{x}+1}$
- Q3. (a) Using derivative as a slope find line that are tangent and normal to the following curve at the given point. $x^2 + y^2 = 25$, $(3, -4)$
- (b) Find the linearization $L(x)$ of the $f(x)$ at $x = a$, where $f(x) = x^3 - 2x + 3$, $a = 2$
- Q4. (a) Find the Taylor series generated by the following function at $x = a$
 $f(x) = x^4 + x^2 + 1$, $a = -2$
- (b) Find the Maclaurin series for function $f(x) = \frac{1}{1+x}$
- Q5. (a) Evaluate the integral $\int \left(2x^2 - 5x + \frac{1}{2x}\right) dx$ (ii) $\int \left(1 - \frac{1}{x^5}\right) dx$
- (b) Evaluate the integral (i) $\int_1^4 \left(\frac{x}{8} + \frac{1}{2x}\right) dx$ (ii) $\int_0^5 x^{\frac{5}{2}} dx$
- Q6. (a) Evaluate the following integral by using the given substitution
 $\int 12(y^4 + 4y^2 + 1)^2 (y^3 + 2y) dy$, substitute $u = y^4 + 4y^2 + 1$.
- (b) Evaluate the integral $\int x \cos x dx$ using by parts formula
- Q7. (a) Evaluate the integral $\int \frac{1}{x(x+2)} dx$ using partial fraction
- (b) Find the area of the region between the x-axis and the graph of $f(x) = -x^2 - 2x$, where $-2 \leq x \leq 2$
- Q8. (a) Evaluate the integral $\int_0^{\pi} \cos dx$
- (b) Find the absolute maximum and minimum values of $f(x) = x^2 - 1$ on $[-1, 2]$.
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