1. Find $y''=\frac{d^2y}{dx^2}$ for function $xy^3=1$ (8%)

2. If $w=\cos(x+y)+\cos(x-y)$ show that $\frac{\partial^2 w}{\partial x^2}-\frac{\partial^2 w}{\partial y^2}=0$ (8%)

3. Find (a) $\lim_{x\to 2}\frac{x^x-2^2}{2^x-x^2}$ (5%)

   (b) $\lim_{x\to -3}\sqrt[3]{\frac{x+3}{x^3+27}}$ (5%)

   (c) $\lim_{x\to 0}(1+3x)^{\frac{1}{2x}}$ (5%)

4. Find all maximum and minimum points and draw the graph of

   $y=e^{2x}+e^{-2x}$ (10%)

5. Find the area bounded by $y=\cos x+1$, $y=3/2$, $x=0$ and $x=\pi$

   (8%)

6. Find the volume of the solid generated by revolving about the x-axis the region bounded by the curves $y=x^2$ and $y^2=x$ (8%)

7. Evaluate

   (a) $\int\frac{dx}{x^2\sqrt{x^2-9}}$ (b) $\int\sin^4 x\,dx$ (c) $\int e^{2x}\sec e^{2x}dx$ (15%)

8. Determine whether the following series converge or diverge

   (a) $\sum_{n=1}^{\infty}(-1)^n\frac{\ln n}{n}$ (b) $\sum_{n=1}^{\infty}\frac{3n^2+5n}{2^n(n^2+1)}$ (10%)

9. Find the interval of convergence of the power series $\sum_{n=1}^{\infty}\frac{1}{\sqrt{n}}x^n$

   (8%)

10. Find the volume of the largest rectangular box with faces parallel to the coordinate planes that can be inscribed in the ellipsoid

    $16x^2+9y^2+4z^2=144$ (10%)