

1. Find the integral of $\int e^x \sin x dx$. (15%)
2. Expand $f(x) = \sin x$ in a Taylor series about $x = 0$. (15%)
3. Find the derivative of (a) $y(t) = \frac{(2t+3)^3}{4t^2-1}$ (5%)
(b) $y(x) = e^{-x} \sqrt{x}$ (5%)
4. Find the integral of (a) $\int (4xe^x - 3x^2 + \sqrt{x}) dx$ (5%)
(b) $\int (\ln x + 3 \cos x) dx$ (5%)
5. Find the length of the curve $y = \frac{x^3}{2} + \frac{1}{6x}$ from $x = 2$ to $x = 4$. (10%)
6. Find (a) $\lim_{x \rightarrow 0} \frac{\sin x}{e^{-x} - 1}$ (5%)
(b) $\lim_{x \rightarrow +\infty} x \sin \frac{\pi}{x}$ (5%)
7. Does $\sum_{n=0}^{\infty} \frac{n^n}{n}$ converge? If not, show the detail. (10%)
8. Solve the following equations for x
(a) $\log_x \frac{8}{27} = 3$ (b) $\log_2 x - \log_2(x-1) = 1$ (10%)
9. (a) Sketch the area of the region between the x -axis and the graph of $f(x) = x^2 - 3x$ from $x = 1$ to $x = 3$. (5%)
(b) Find the magnitude of the area R . (5%)