1. Find the derivative of (a) $\sin^3(4x)$ (5%)

   (b) $\dfrac{1}{(2x^5-7)^3}$ (5%)

2. Find the integral of (a) $\int(4xe^{-x}+3x^{-2}+\sqrt{x})dx$ (5%)

   (b) $\int(\ln x+3\cos x)dx$ (5%)

3. Find the length of the curve $y=(4-x^{2/3})^{3/2}$ from x = 1 to x = 8. (10%)

4. Find (a) the average value of $f(x)=\cos^2 x$ on $[0,2\pi]$. (5%)

   (b) the slope of the tangent line to the graph of $x^2+4y^2=4$ at the point $(\sqrt{2},\dfrac{-1}{\sqrt{2}})$. (5%)

5. Let R be the region bounded by the curves $y^2=4x$ and $4x-3y=4$.

   (a) Sketch the area R. (7%)

   (b) Find the area R. (8%)

6. Expand $f(x)=e^{-x}$ in a Taylor series about x = 0. (10%)

7. Find (a) $\lim\limits_{x\to 0}\dfrac{\sin x-x}{x^3}$ (5%)

   (b) $\lim\limits_{x\to\infty}\dfrac{e^{-x}}{x^{-1}}$ (5%)

8. Does $\sum\dfrac{n}{5n^2-4}$ converge? If not, show the detail. (5%)

9. Find (a) the integral of $\int x^2\sin axdx$ (10%)

   (b) the integral of $\int\dfrac{x^2-x}{x+1}dx$ (10%)