1) Sketch the graph of $f(x)=2x^3+12x+17$ and $f(x)=x^2-3x^{2/3}$ 10%

2) Show that (a) if $f(x)=\tan x$, then $f'(x)=\sec^2 x$ and (b) $f(x)=a^x$,

then $f'(x)=a^x \log a$. 10%

3) Evaluate $\lim_{x\to 9}\frac{\sqrt{x}-3}{x-9}$ and $\lim_{x\to 0}\frac{x}{1+\sin x}$ 10%

4) Find $\int\frac{x+1}{\sqrt{x^2+2x}}dx$ and $\int_0^1 x\sqrt{x+1}dx$ 10%

5) Suppose S is a cone lying between the planes that pass through $x=0$ and $x=6$ that every cross section of S perpendicular to the x-axis is a circle with radius $x/2$. Find the volume of S. 10%

6) Show that $e^x=\sum_{n=0}^{\infty}\frac{x^n}{n!}$ and find $\sum_{n=1}^{\infty}\frac{1}{n(n+1)}$ 10%

7) Find the length of the cardioid $r=2(1+\cos\theta)$ 10%

8) Evaluate $\int_0^1\int_x^1 e^{y^2}dydx$ and $\int_0^2\int_0^{\sqrt{4-x^2}} e^{-x^2}e^{-y^2}dydx$ 15%

9) Find a particular solution to

$$y''-y'-2y=e^x-2x^2$$ 15%