Project 1 for Mathematics 2

1. Solve the integrals:

a) $\int 4x^3\left(x^4-5\right)dx$ b) $\int \frac{3x^2}{\left(x^3+7\right)^{1/3}}dx$ c) $\int_0^2 (x+2)\sqrt{x^2+4x+1}\,dx$ d) $\int \frac{1}{x^2-3x+5}dx$

d) $\int xe^{-x}dx$ e) $\int \ln^2 x\,dx$ f) $\int \sqrt{x^2+144}dx$ g) $\int \frac{x}{\sin^2 x^2}dx$ h) $\int_0^1 \frac{x}{\sqrt{x+1}}dx$ k) $\int \frac{1}{x^2+12}dx$

2. Find the area between the functions

a) $y=x^2-1,\ y=1-x^2$. b) $y=\frac{1}{x},\ x=1,\ x=5,\ y=0$ c) $y=x^2, y=0,\ x=3$

3. Find the volume of the solid generated by revolving the region bounded by
   a) $y=4x-x^2$ and $y=0$ b) $y=x^2,\ y=1,\ x=3$ c) $y=2x^2,\ y=3-x^2$
   about the x-axis

4. Find the volume of the solid generated by revolving the region bounded by
   a) $y=x^3,\ y=2,\ x=0$ b) $y=\frac{1}{x},\ y=2,\ y=4,\ x=0$ c) $y=\sqrt{x},\ y=2,\ x=0$.
   about the y-axis.

5. Find the interval of convergence of the power series

a) $\sum_{n=1}^{\infty}\frac{1}{n\sqrt{n}}(x-1)^n$ б) $\sum_{n=1}^{\infty}\frac{2n+1}{3n^2+2}(x-1)^n$

6. Using some of the tests show which of the following series converges.

a) $\sum_{n=1}^{\infty}\frac{e^n}{n}$ б) $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{2n-1}{2^{n-1}}$ c) $\sum_{n=1}^{\infty}\frac{1}{n^2-1}$ d) $\sum_{n=1}^{\infty}(-1)^n\frac{n^3}{n-1}$