Course : **Mathematics B2 (Newton)**

Date : January 9, 2015
Time : 13.45 - 14.45

Motivate all your answers and calculations.
Use of electronic devices is not allowed.

[3p] **1.** Let the function $x^3 - 2x^2$ be given for $0 \leq x \leq 1$. Find a formula for the Riemann sum obtained by dividing the interval $[0, 1]$ into n equal subintervals and using the right-hand endpoint in each subinterval.

[3p] **2.** Determine $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ in case

$$y(x) = x \int_0^{x^2} e^{t^2} \, \mathrm{d}t.$$

[3p] **3.** a) Evaluate

$$\int_0^{\infty} \frac{1}{e^{2t}} \, \mathrm{d}t.$$

[4p] b) Find

$$\int \sin(\sqrt{t}) \, \mathrm{d}t.$$

[2p] **4.** a) Give the interval of convergence and the sum of

$$\sum_{n=0}^{\infty} (-4x^2)^n.$$

[3p] b) Find the Taylor polynomial of order 2 generated by $x^2 + \tan^{-1}(2x)$ at $x = 0$.

Total: 18 points