



**PHILADELPHIA UNIVERSITY**  
**DEPARTMENT OF BASIC SCIENCES**

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**Second Exam**

**MATHEMATICS I**

**22-12-2005**

1. Find the derivatives.

a)  $f(x) = \frac{2x^3 - 3x^2 + 4x - 5}{x^2}$

b)  $f(x) = \sin(2x) \cos(3x)$

c)  $f(x) = \tan^2(\sin \sqrt{x})$

2. Find  $y'$  using implicit derivative and then find the equation of the tangent line for  $x^3 + y^3 = 3xy$  at the point  $\left(\frac{3}{2}, \frac{3}{2}\right)$ .

3. Find the inflection points, local maximum and local minimum of the function  $f(x) = x^3 - 3x^2 + 3$

4. Evaluate the limit

a)  $\lim_{x \rightarrow \infty} \frac{5x^3 - 2x + 1}{2 - 4x^2 - x^3}$

b)  $\lim_{x \rightarrow \infty} \frac{8 - \sqrt{x}}{2 + x}$