



رقم الفصل:

اسم الطالب:

معطي جدول للمشتقات في الصفحة الثانية

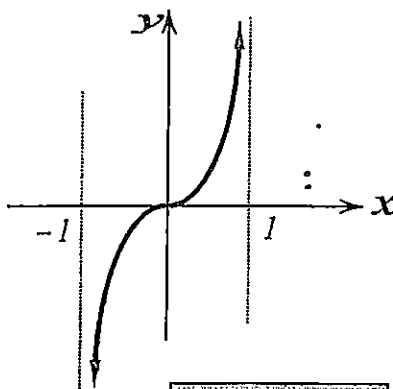
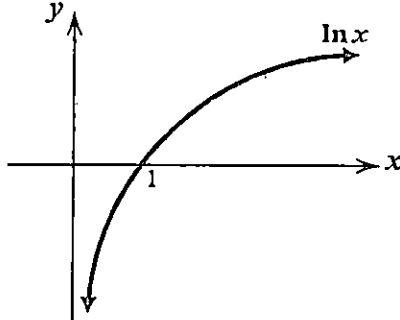
مسموح الحل بالقلم الرصاص

الامتحان في اربع صفحات

### Answer the following Problems

#### Problem 1 [6 marks]

Complete the following table (using the given functions)

 <p><math>f(x) = \tanh^{-1} x</math></p>	 <p><math>f(x) = \ln x</math></p>	
	Domain	
	Range	
	Zeros	
	Asymptotes	
$\lim_{x \rightarrow 1^-} (\tanh^{-1} x) =$		$\lim_{x \rightarrow 0^+} (\ln x) =$

Problem 2 [4 marks]

Find  $\frac{dy}{dx}$  of the following functions:

i)  $y = (e^{\sin^{-1} x}) (\sec (x^3 \ln x))$

Solution

ii)  $y = \sinh(\tanh^{-1}(3^{\tan^{-1} x}))$

Solution

$f(x)$	$x^n$	$\sqrt{x}$	$e^x$	$a^x$	$\ln x$	$\sec x$	$\sin x$
$f'(x)$	$nx^{n-1}$	$1/2\sqrt{x}$	$e^x$	$a^x \ln a$	$1/x$	$\sec x \tan x$	$\cos x$

$f(x)$	$\cosh x$	$\sinh x$	$\tanh x$	$\tanh^{-1} x$	$\tan^{-1} x$	$\sinh^{-1} x$	$\sin^{-1} x$
$f'(x)$	$\sinh x$	$\cosh x$	$\operatorname{sech}^2 x$	$\frac{1}{1-x^2}$	$\frac{1}{1+x^2}$	$\frac{1}{\sqrt{1+x^2}}$	$\frac{1}{\sqrt{1-x^2}}$

Problem 3 [6 marks]

Find  $\frac{dy}{dx}$  of the following:

i)  $y = (4^x \tanh x)^{(\sinh^{-1}(\sqrt{x}))}$

Solution

ii)  $\cosh(x + y) = y^2 \sin x$

Solution

Problem 4 [4 marks]

i) At what point on the curve  $y = e^x$  is the slope of the tangent equal two?

Solution

ii) Prove that  $\sinh^{-1} x = \ln(x + \sqrt{1 + x^2})$ ,  $x \in \mathbb{R}$

Solution