

Fayoum University
Faculty of Engineering

First Term Final Exam
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CALCULS I

December, 31, 2015.
Time:180 Min.

1) Use the definition of the first derivative;

$$\frac{d}{dx} f(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

to find the first derivative of $y = f(x) = \cos x$.

2) Find $\frac{dy}{dx}$ when :

a) $y = \cos^{-1}(x^2 + 1)^3 + (\cos(x^2 + 1)^3)^{-1}$

b) $y = \sqrt{x^x}$

c) $x^y = \cos(xy)$

d) $y = (\sin^{-1}x)^{(\sinh^{-1}x)}$

3) Sketch the curve : $xy = x^2 + 4$

4) If

$$y = \frac{\sin^{-1}x}{\sqrt{1-x^2}}$$

show that :

$$(1-x^2)y^{(1)} - xy = 1.$$

Hence Show that :

$$(1-x^2)y^{(n+1)} = x(2n+1)y^{(n)} + n^2 y^{(n-1)}$$

5) Find the Maclurin series for the function :

$$f(x) = x^3 \cos^2 x.$$

GOOD LUCK