

The exam consists of one page Answer All Questions No. of Questions: 4 Total Mark: 40

Question 1 (12 Marks)

Find $\frac{dy}{dx}$

(i) $y = 2x^4 + 3^x + 3x$

(ii) $y = 3 + \sin 3x + \sinh x$

(iii) $y = \tanh x + \log(x^2 + 3)$

(iv) $y = \tan^{-1} x + \tanh^{-1} 2x$

(v) $y = 8 + (x + e^{2x})^5$

(vi) $y = \cos \ln x + \ln \sin x$

(vii) $y^3 = x^3 + 3^x + \sin y$

(viii) $y = \sin^{-1} t + \sec t, \quad x = \sinh^{-1} t + \operatorname{sech} t$

Question 2 (6 Marks)

(a) Determine the extrema of the function: $f(x) = x + \frac{1}{x}$.

(b) Find the Maclaurin's expansion of the function: $f(x) = x + e^{2x}$.

Question 3 (18 Marks)

Find the integrals:

(i) $\int (2x^2 - 3^x + 3) dx$

(ii) $\int \left(\frac{1}{x} + \frac{1}{x^3}\right) dx$

(iii) $\int (3 - 2^x)^2 dx$

(iv) $\int \left(\frac{2x}{1+x^2} + \frac{1}{1+x^2}\right) dx$

(v) $\int (3 + 2x^2)^8 \cdot 4x dx$

(vi) $\int \ln x dx$

(vii) $\int \cos^2 3x dx$

(viii) $\int (\cos 3x \cdot \cos x) dx$

(ix) $\int \frac{2x-1}{x^2-6x+8} dx$

Question 4 (4 Marks)

(a) Find the area of the region bounded by $y = x^2 - 1$, x-axis, x in $[0, 2]$.

(b) If the region between the curve $y = x^2 - 1$, x-axis, x in $[0, 2]$, is rotated about x-axis and y-axis. Find the volume V_x and the volume V_y .

Good Luck

Dr. Mohamed Eid

Mathematics I Code: Math 101	Time: 60 Minutes
Mid-Term Exam: March, 2015	Answer All questions Total Mark: 30
<p>ممنوع إستخدام المحمول كألة حاسبة. يُسمح فقط بإستخدام الآلة الحاسبة العادية Do not use Mobile as Calculator. Only use Calculator</p>	
<p>[1] Find $\frac{dy}{dx}$</p> <p>(i) $y = 3x^3 - 2^x + 3$ (ii) $y = 3^{x^2} + \ln(x + 2)$ (iii) $y = \sin 2x + \sinh x^2$ (iv) $y = (\cos x + 3)^6$ (v) $y = x^2 \cdot \log x$ (vi) $y = \tan^{-1} x \cdot \tanh^{-1} x$ (vii) $y^3 = 3^y + x \cdot \tan x$ (viii) $y = t - \operatorname{sech} t$, $x = t + \sec 2t$</p> <p>[2] Write the Maclurin's expansion of the function: $f(x) = e^{x^2}$.</p> <p>[3] Find: (a) $\lim_{x \rightarrow 0} \frac{\ln(1+x)}{1-3^x}$ (b) $\lim_{x \rightarrow \infty} \frac{x^4 - 2x}{3 + x^5}$ (c) $\lim_{x \rightarrow 0} \frac{e^x - x - 1}{e^{-x} + x - 1}$</p> <p>[4] Determine the extrema of the function: $f(x) = x^3 - 3x^2 - 24x$</p>	

Good Luck

Dr. Mohamed Eid

Quiz 2-I : Find the integrals:

(1) $\int (x^3 - 3^x + 3) dx$

(2) $\int (x^{-2} + 3^{x^2} \cdot 2x) dx$

(3) $\int (2x^2 + 3)^2 dx$

(4) $\int (2x^2 + 3)^{-6} \cdot 4x dx$

(5) $\int \left(\frac{1}{x} + \frac{4}{x-2} \right) dx$

(6) $\int \frac{x^2}{x+2} dx$

(7) $\int \frac{x+1}{x^2-5x+6} dx$

(8) $\int \ln x dx$

Quiz 2-II: Find the integrals:

(1) $\int (x^{-3} + 2^x - 2) dx$

(2) $\int (x^2 + 4^{x^2} \cdot 2x) dx$

(3) $\int (x^3 - 1)^2 dx$

(4) $\int (x^2 + \ln 3)^6 \cdot 2x dx$

(5) $\int \left(\frac{3}{x+2} - \frac{4}{x} \right) dx$

(6) $\int \frac{x^2}{x-2} dx$

(7) $\int \frac{x}{x^2+4x+3} dx$

(8) $\int \log x dx$

Quiz 2-III: Find the integrals:

(1) $\int (4^x + x^4 - 4x) dx$

(2) $\int (\frac{1}{x^3} + 8^{x^2} \cdot 2x) dx$

(3) $\int (2 - x^3)^2 dx$

(4) $\int (5 - x^2)^5 \cdot 2x dx$

(5) $\int (\frac{1}{x+2} + \frac{3}{2x}) dx$

(6) $\int \frac{x+2}{x-2} dx$

(7) $\int \frac{x-1}{x^2+5x+4} dx$

(8) $\int x \cdot 2^x dx$

Quiz 2-IV: Find the integrals:

(1) $\int (3^{2x} + x^3 - \ln 2) dx$

(2) $\int (\frac{1}{x^4} + 4^{x^3} \cdot 3x^2) dx$

(3) $\int (2 - 3^x)^2 dx$

(4) $\int (2 + e^x)^8 \cdot e^x dx$

(5) $\int (\frac{1}{2x+1} + \frac{2x+1}{x^2+x}) dx$

(6) $\int \frac{1}{x^2-4x+4} dx$

(7) $\int \frac{x-2}{x^2-6x-7} dx$

(8) $\int x \ln x dx$

I-Find y' , where

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

(2) $y = \log x + \ln(x + \sin x)$

(3) $y = (2x + 2^x)^6 + \tan 2x$

(4) $y = 2^{\sin x} + \sinh 2x$

(5) $y = \tan^{-1} x \cdot \tanh^{-1} x^2$

(6) $y = x + 4^x + \cos(x - 1)$

(7) $y = x^3 \cdot 3^x + \tan \ln x$

(8) $y^3 = x^3 + 3^x + \cos y$

(9) $y = \sin^{-1} 2t + \sec t, \quad x = \sinh^{-1} t^2 + \operatorname{sech} t$

II-Find y' , where

(1) $y = x^{-4} + 4^x + 3 \sin x$

(2) $y = \ln x + \log(x - \cos x)$

(3) $y = (x^2 + 2^x)^5 + \tanh x$

(4) $y = 3^{\cos x} + \cosh 3x$

(5) $y = \sin^{-1} x \cdot \sinh^{-1} x^2$

(6) $y = 4x + 2^{-x} + \cos(x + 3)$

(7) $y = x^3 \cdot \cosh x + \sin \ln x$

(8) $y^4 = x^3 - 3^x + \tan y$

(9) $y = \tan^{-1} t + \sec 2t, \quad x = \tanh^{-1} t + \operatorname{sech} t^2$