MTH 111, Math for the Architects , Exam III

Ayman Badawi

QUESTION 1. (16 points) Find $y' = dy/dx$ do not simplify

(i) $y = 3sin(4x) + (1 + tan(x))^4$

(ii) $y = (3x + 1)sec(3x + 1)$

(iii) $y = ln\left((sin(x) + 3x)^7(cos(3x) + 4)^7\right)$

(iv) $y = e^{(sin(x)+3x)} + ln(cos(5x)) + 7x - 13$

QUESTION 2. (8 points) Find the equation of the tangent line to the curve $sin(y-2)+xy+cos(x)-2y+3=0$ at the point $(0,2)$

QUESTION 3. (12 points) Sketch the graph of $f(x)=y=cos(2x)+8x+2$ defined on $[-\pi,\pi]$ by considering the first derivative and the second derivative of f(x).

QUESTION 4. (20 points)

(i) Evaluate $\int_0^\pi sin(x) - cos(x)\ dx$

(ii) Find the area of the region bounded by $y = sin(x) - cos(x)$ and the x-axis, x = 0, and $x = \pi$[Hint: between 0 and π, sin(x) = cos(x) only when $x = \pi/4$. Note $sin(\pi/4) = cos(\pi/4) = \sqrt{2}/2$]. Is the answer the same as in (i)? Are you surprised?

(iii) Find $\displaystyle\int \frac{x + sec^2(2x)}{x^2 + tan(2x) + 10}\ dx$

(iv) Find $\displaystyle\int \frac{(1 + \sqrt{x})^5}{\sqrt{x}}\ dx$

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