

SMA 2173/STA 2105: CALCULUS II**TIME: 1.5Hrs****INSTRUCTIONS: Answer All questions.**(1) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ given;

(i) $x = \frac{t^2}{1-2t}$, $y = \frac{t^2+3}{1-2t}$ at $t = 4$

[4 marks]

(ii) $x = \sin^{-1}(2t)$, $y = \cos^{-1}(2t)$

[4 marks]

(2) Sketch the following curves

(i) $y(x) = x\sqrt{4-x}$

[4 marks]

(ii) $y(x) = 2 - x - x^3$

[4 marks]

(3) Identify the asymptotes in $y = \frac{x^2-2x+4}{x-2}$, hence sketch the curve.

[5 marks]

(4) Find the equation of the tangent and normal lines to the curve $x^2 + \ln(x+1) + y^2 = 4$ at $(0,2)$.

[4 marks]

(5) Evaluate the following integrals

(i) $\int x(3+5x)^6 dx$

[3 marks]

(ii) $\int \frac{x^2+2x+3}{x^3+3x^2+9x} dx$

[3 marks]

(iii) $\int \frac{x\sqrt{x}}{x^2\sqrt{x}} dx$

[4 marks]

(iv) $\int a^x \tan(ax) dx$

[3 marks]

(v) $\int (3-x)7^{(3-x)^2} dx$

[4 marks]

(vi) $\int e^{8x} \cos(e^{8x}) dx$

[3 marks]