MA1A2E Nov 2014

Question 1

Is $h(a) = \sqrt[3]{\frac{seca}{a^5}}$ even, odd or neither? (2)

Question 2

Find the domain of $f(x) = \sqrt[4]{\frac{x^2-5x-6}{x^3+8}}$. (5)

Question 3

Prove $\lim_{x \to 0} \frac{sinx}{x} = 1$, without using L'Hospital's Rule. (5)

Question 4

Find $\lim_{k\to 0} \frac{sin2k}{sin7k}$, without using L'Hospital's Rule. (3)

Question 5

Sketch: $f(x) = \begin{cases} -3 & if \quad x \leq -2 \\ 3^{-x} & if \quad -2 < x \leq 3 \\ \sqrt{x+1} & if \quad x > 3 \end{cases}$ (3)

Question 6

Let $g(x) = \begin{cases} B^3x^2; & x < 1 \\ B^2 - 2B; & x \geq 1 \end{cases}$

Find B given that g is continuous at 1. (3)

Question 7

(a) Find $f'(2)$ from First Principles if $f(x) = \frac{2}{3x-1}$. (5)

(b) **Hence,** find the equation of the tangent to f at $x = 2$. (2)

Question 8

Find the point(s) where the tangent(s) to

$h(d) = \frac{2x}{x^4+3}$ is/are horizontal. (5)

Question 9

Differentiate:

(a) $y = log_5(e^{3x})$ (2)

(b) $y = 2sin^{-1}(\sqrt{5x})$ (2)

(c) $y = \frac{x^3 ln2x}{sinx}$, using logarithmic differentiation. (4)

Question 10

Determine:

(a) $\lim_{x\to-\infty} \frac{\sqrt{1+x^8}}{x^4+1}$ (3)

(b) $\lim_{u\to 2} \frac{\sqrt{4u+1}-3}{u-2}$ (3)

(c) $\lim_{x\to 0} x\sin\frac{2}{x}$ (3)

TOTAL : 50