SHENTON COLLEGE

ATMAM Mathematics Methods

Test 1 Calculator Free

Name: .....

Teacher: Friday Smith

Time Allowed : 25 minutes

Marks /27

Materials allowed: Formula Sheet.

Attempt all questions.
All necessary working and reasoning must be shown for full marks.
Where appropriate, answers should be given as exact values.
Marks may not be awarded for untidy or poorly arranged work.

1 Differentiate each of the following with respect to x, clearly showing use of the appropriate rules. Do not simplify your answers.

a) $y = \frac{5x^3}{4} + 2x^2 - \frac{7}{x}$

b) $y = (3x^2 - 1)(5 - 2x)$ (2, 2)

c) $y = \sqrt{e^{3x} + 2}$

d) $y = \frac{\cos(x + \frac{\pi}{4})}{x^2}$ (2, 2)

2 Given that $t = \sin 3w$ and $w = v^2 - 1$, find $\frac{dt}{dv}$ using the chain rule. Give your answer in terms of v. (3)

3 Consider the function $f(x) = 2x^3 + 12x^2 + 18x - 3$.

a) Use calculus to determine the location of all stationary points. (4)

b) Use the second derivative to determine the nature of those stationary points. (2)

c) Show how the point where the concavity of the function changes can be located by using both of the derivatives you found in part a). (2)

4 Find $f'(1)\ and\ f''(1)$ for the function $f(x) = 4e^{x^2-1}$ (4)

5 Differentiate the function $f(x) = (x+1)^2$ using the first principles limit $\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$. (4)