CfE HIGHER MATHS – December Assessment

Q1. For the polynomial, $6x^3 + 7x^2 + ax + b$

- $x + 1$ is a factor
- 72 is the remainder when it is divided by $x - 2$

(a) Determine the values of a and b. (4)

(b) Hence solve $6x^3 + 7x^2 + ax + b = 0$ (4)

Q2. Find the derivative of

$$f(x) = \frac{2}{3}\sin(3x - 1)$$ (2)

Q3. A function is defined as $g(x) = x(x-3)^2$.

Find the stationary points of this function (4)

Q4. Find the value(s) of k for which the equation in x

$x^2 + 9 = kx$ has no real roots (4)

Q5 Solve algebraically the equation

$5\cos x = 6\cos 2x + 4$, where $0 \leq x \leq \pi$ (5)

Q6 Make a sketch of the function,

$$f(x) = -\log_a(x-2) \qquad (3)$$

indicating on your sketch where the function crosses the x-axis.

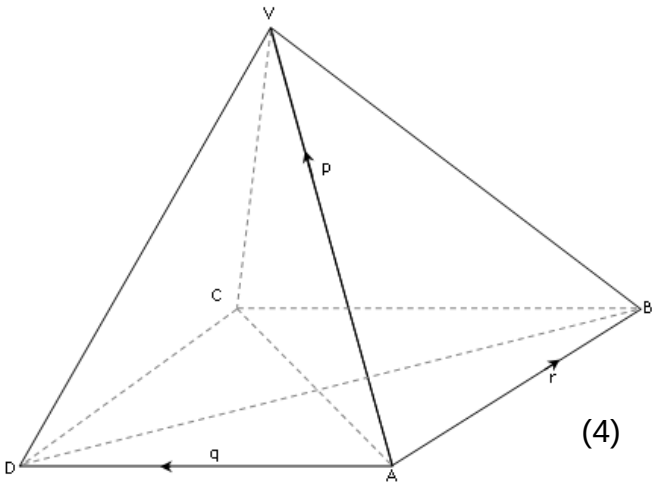
Q7 Find $f'(x)$ when $f(x) = \frac{x^3 - 2\sqrt{x}}{x}$, x > 0, expressing your answer with positive indices. Hence calculate the exact value of the gradient of the tangent to the curve $y = f(x)$ at $x = \frac{1}{9}$

(6)

Q8 In the square-based pyramid, all the eight edges are of length 3 units.

$\overrightarrow{AV}$ = ***p***, $\overrightarrow{AD}$ = ***q***, $\overrightarrow{AB}$ = ***r***

Evaluate ***p***.(***q*** + ***r*** - ***p***)



(4)

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