

SENIOR SIX MATHS HOLIDAY WORK(PAPER 2,APPLIED), APRIL2015

INSTRUCTIONS.

1)All work should be done on full scups and stapled together

2)Work should be handed in on the second day of term 2.

3)Do all the questions.

4)Take $g=9.8ms^{-2}$ where applicable.

5)Any graph work should be on a standard graph paper.

1)The table below shows the heights measured in cm for a group of senior six students;

Heights(cm)	177-186	187-191	192-196	197-201	202-206	207-216
Frequency	12	8	8	9	7	6

(a) Draw a histogram and superimpose a frequency polygon. Hence state the modal class.

(b) Calculate the mean and variance.

2)A body of mass 0.2kg is acted upon by a force $F= 8ti-4t^2 j+2(3-t^2)k$ Newtons. Initially, the body is at rest at a point with position vector $-10i+12j-4k$. Find the

(i)velocity after time t seconds,

(ii) distance covered by the body in 2seconds.

3)The cumulative distribution function of a discrete random variable x is as shown in the table below.

x	1	2	3	4
$F(x)$	0.14	0.47	0.79	1.00

Find (i) $P(2 < x \leq 4)$ (ii) the median of x (iii) $P\left[\frac{x < 3}{2 \leq x < 4}\right]$ (iv) the mean of x .

4)An object of mass 4kg moves under the action of three forces $F_1 = \begin{pmatrix} t-1 \\ 2 \\ t-3 \end{pmatrix}$ N, $F_2 = \begin{pmatrix} t+2 \\ 2 \\ t-4 \end{pmatrix}$ N and

$F_3 = \begin{pmatrix} t-2 \\ 3t-2 \end{pmatrix}$ N at time t seconds. Find the (i) work done by the resultant force when the object is

displaced from point A(4,5,) to a point B(7,-9) within a time of 1second. (ii) size of the

acceleration of the object after a time of 2seconds.(iii) power developed when the object moves with velocity of $3i-6j \text{ ms}^{-1}$ after a time of 2seconds.

5) The probability density function of a continuous random variable x is given by

$$f(x) = \begin{cases} \frac{2}{13}(x+1); 0 \leq x \leq a \\ \frac{2}{13}(5-x); a \leq x \leq b \\ 0; \text{otherwise} \end{cases}$$

(i) Find the values of a and b . Hence, sketch $f(x)$

(ii) Calculate the mean and standard deviation of x .

(iii) Find $P(x < 2.5)$.

6) Two smooth inclined planes meet at right angles, the inclination of one to the horizontal being 30° and the other being 60° . Bodies of masses 2kg and 4kg lie on the respective planes, and the two masses are joined by a light inextensible string passing over a smooth fixed pulley at the intersection of the planes. If the masses are released from rest, find the acceleration of the masses and tension of the string. If the surface with 4kg mass experiences a frictional force of 0.25N, find the new acceleration of the masses when the system is set from rest.

7(a) The table below shows x and $f(x)$:

x	50.24	48.11	46.93	44.06
$f(x)$	4.116	7.621	9.043	11.163

Use linear interpolation or extrapolation to estimate (i) x when $f(x)=8.614$, (ii) $f(51.07)$

(b) use trapezium rule with six ordinates to find the value of $\int_{\frac{1}{2}}^1 \frac{x^2}{x^2+1} dx$, correct to three decimal

places. Find the exact value of $\int_{\frac{1}{2}}^1 \frac{x^2}{x^2+1} dx$, correct to three decimal places. How can you improve on

the degree of accuracy?

8) Show by sign-change search method that the equation $3x^2 - x - 5 = 0$ has a real root between $x = -1.4$ and $x = -1.2$. Hence, use linear interpolation three times to evaluate the root, correct to two decimal places.