

PART 1

MULTIPLE-CHOICE ANSWER SHEET

1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
11	A	B	C	D	E
12	A	B	C	D	E
13	A	B	C	D	E
14	A	B	C	D	E
15	A	B	C	D	E
16	A	B	C	D	E
17	A	B	C	D	E
18	A	B	C	D	E
19	A	B	C	D	E
20	A	B	C	D	E
21	A	B	C	D	E
22	A	B	C	D	E
23	A	B	C	D	E
24	A	B	C	D	E
25	A	B	C	D	E
26	A	B	C	D	E
27	A	B	C	D	E
28	A	B	C	D	E
29	A	B	C	D	E
30	A	B	C	D	E
31	A	B	C	D	E
32	A	B	C	D	E
33	A	B	C	D	E

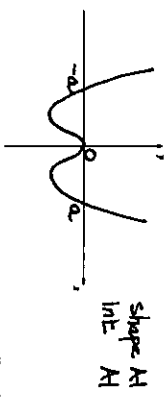
Question 1

a. Find the linear factors of $x^3 - 10x^2 + 15x - 6$.

$x^3(x^2 - a^2)$
 $= x^2(x-a)(x+a)$

M1
A1

b. Given that $a > 0$, sketch the graph of $f(x) = x^2 - 2ax + a^2$. Do not find the coordinates of any stationary points. (1 mark)



Question 2 (2 marks)

a. Find $\frac{d}{dx}(e^{2x+1})$.

Using chain rule: $2ae^{2x+1}$

M1
A1

Question 3 (2 marks)

b. Hence, find the exact value of $\int_0^1 xe^{2x+1} dx$.

$\frac{1}{2} \int_0^1 2xe^{2x+1} dx$
 $= \frac{1}{2} [e^{2x+1}]_0^1$
 $= \frac{1}{2} (e^3 - e)$

M1
A1

Question 3

For the function $f(x) = 2 - 3\sin(\frac{x}{2})$, where:

a. 1. its amplitude 3 A1
 2. its range [-1, 2] A1

b. Find $f^{-1}(1)$ giving exact values for x . (2 marks)

$2 - 3\sin(\frac{x}{2}) = 1$
 $\therefore \sin(\frac{x}{2}) = \frac{1}{3}$
 $\frac{x}{2} = \frac{\pi}{6}, \frac{5\pi}{6}$

M1
A1

Question 4 (2 marks)

Given that the solution to the equation $\log_2(x-3) = 1 + x = \frac{1}{2}$, find the values of a and b , where a and b are both integers.

$\log_2(x-3) = 1 + x = \frac{1}{2}$
 $\Leftrightarrow \frac{x-3}{2^2} = 10$
 $\Leftrightarrow \frac{x-3}{2^2} = 10$
 $\Leftrightarrow x = 10 \times 2 + 3 = 23$
 $\therefore a = \frac{23}{2}, b = 9$

M1
A1

Question 5 (2 marks)

Given that the random variable X has a normal distribution with mean a and variance 9 , show that if $P(X < 2) = 0.60$, then $a < 0.2533b - 3$.

$P(X < 2) = 0.60 \Rightarrow P(Z < \frac{2-a}{3}) = 0.6$
 $\therefore \frac{2-a}{3} = 0.2533$
 $\therefore 2 = a + 0.2533b$

M1
A1

Question 6 (2 marks)

A sample of 40 major cricket matches that 12 are test matches. If p is the proportion of major cricket that are test matches from this sample, find the standard error of p .

$SE(p) = \sqrt{\frac{p \times (1-p)}{40}} = 0.0725$

M1
A1

Total 17 marks

[NB: multiples of 50 and 9 is acceptable]