IB SL MATHEMATICS

REVIEW QUESTIONS #1

Complete all questions showing all work. All questions should be handed in on Friday of the week assigned.

1. The function *f* is given by

$$f(x) = \frac{2x+1}{x-3}, \; x \in \mathbb{R}, \; x \neq 3.$$

    (a) (i) Show that $y = 2$ is an asymptote of the graph of $y = f(x)$.

    (2)

    (ii) Find the vertical asymptote of the graph.

    (1)

    (iii) Write down the coordinates of the point *P* at which the asymptotes intersect.

    (1)

    (b) Find the points of intersection of the graph and the axes.

    (4)

    (c) Hence sketch the graph of $y = f(x)$, showing the asymptotes by dotted lines.

    (4)

    (d) Show that $f'(x) = \dfrac{-7}{(x-3)^2}$ and hence find the equation of the tangent at the point *S* where $x = 4$.

    (6)

    (e) The tangent at the point *T* on the graph is parallel to the tangent at *S*.

    Find the coordinates of *T*.

    (5)

    (f) Show that *P* is the midpoint of [*ST*].

    (1)
    (Total 24 marks)

2. One thousand candidates sit an examination. The distribution of marks is shown in the following grouped frequency table.

Marks	1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80	81–90	91–100
Number of candidates	15	50	100	170	260	220	90	45	30	20

(a) **Copy** and complete the following table, which presents the above data as a cumulative frequency distribution.

(3)

Mark	≤10	≤20	≤30	≤40	≤50	≤60	≤70	≤80	≤90	≤100
Number of candidates	15	65					905			

(b) Draw a cumulative frequency graph of the distribution, using a scale of 1 cm for 100 candidates on the vertical axis and 1 cm for 10 marks on the horizontal axis.

(5)

(c) Use your graph to answer parts (i)–(iii) below,

    (i) Find an estimate for the median score.

(2)

    (ii) Candidates who scored less than 35 were required to retake the examination. How many candidates had to retake?

(3)

    (iii) The highest-scoring 15% of candidates were awarded a distinction. Find the mark above which a distinction was awarded.

(3)
(Total 16 marks)