

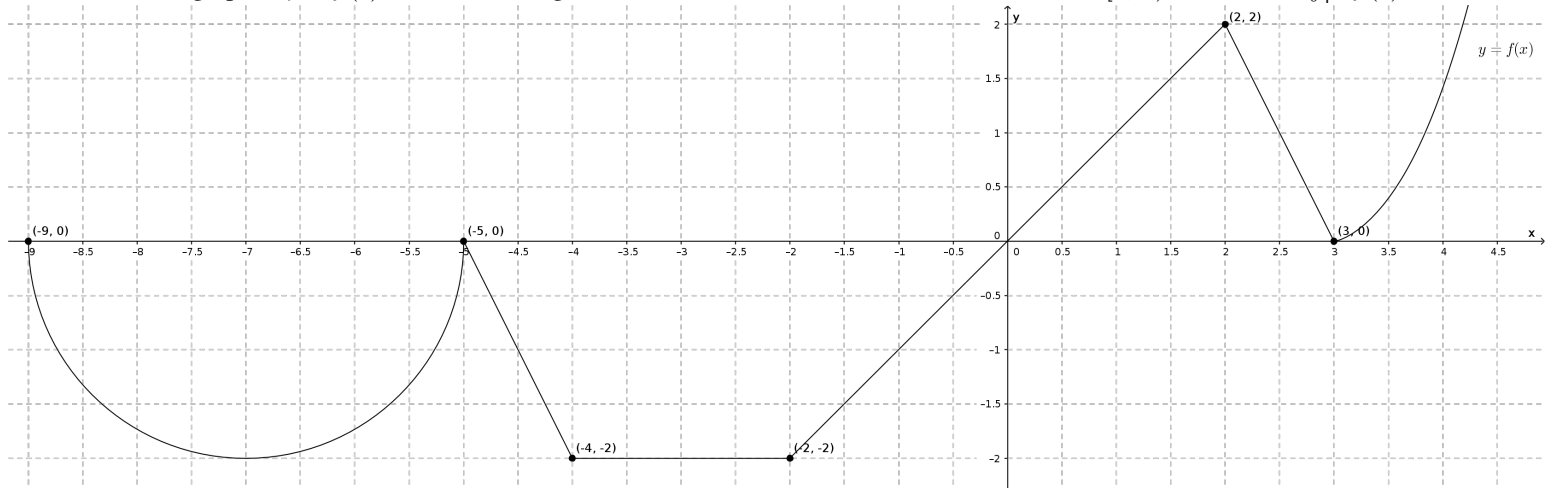
Books, watches, notes or cell phones are **not** allowed. The **only** calculators allowed are the Sharp EL-531***. You **must** show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1. (3 marks) Determine and sketch the region whose area is equal to

$$\lim_{n \rightarrow \infty} \frac{2}{n} \sum_{i=1}^n \arctan \left(1 + \frac{2i}{n} \right)$$

Do not evaluate the limit.

Question 2. The graph of $y = f(x)$ consists of straight lines, one semicircle and a curve on the interval $[3, \infty)$. In addition, $\int_4^3 9f(x) dx + 4 = 0$.



- (3 marks) Find an approximation of the definite integral of $f(x)$ on the interval $[-4, 2]$, using the midpoints as sample points and 3 approximating rectangles. Draw the approximating rectangles.
- (5 marks) Evaluate $\int_{-1}^4 f(x) dx$.