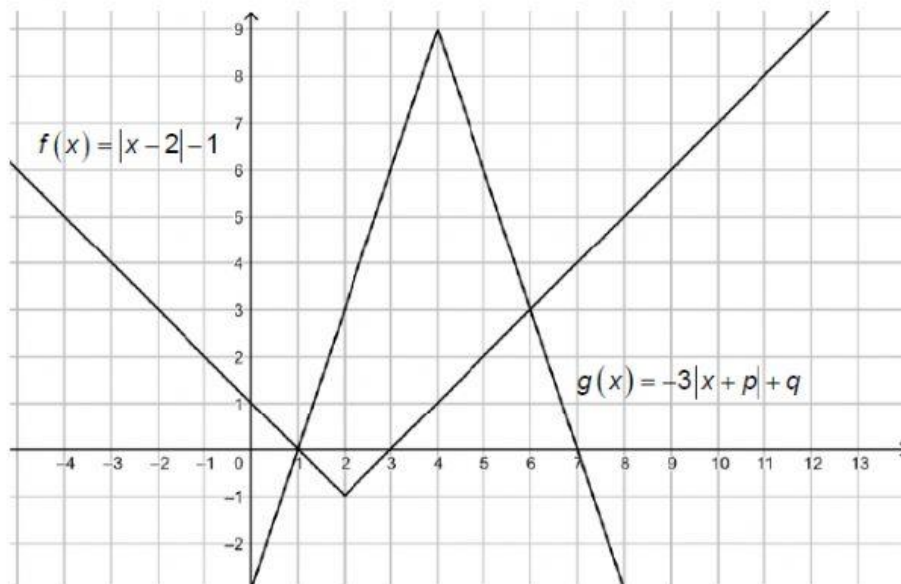9.2 Consider the functions $f(x) = |x - 2| - 1$ and $g(x) = -3|x + p| + q$ drawn below:
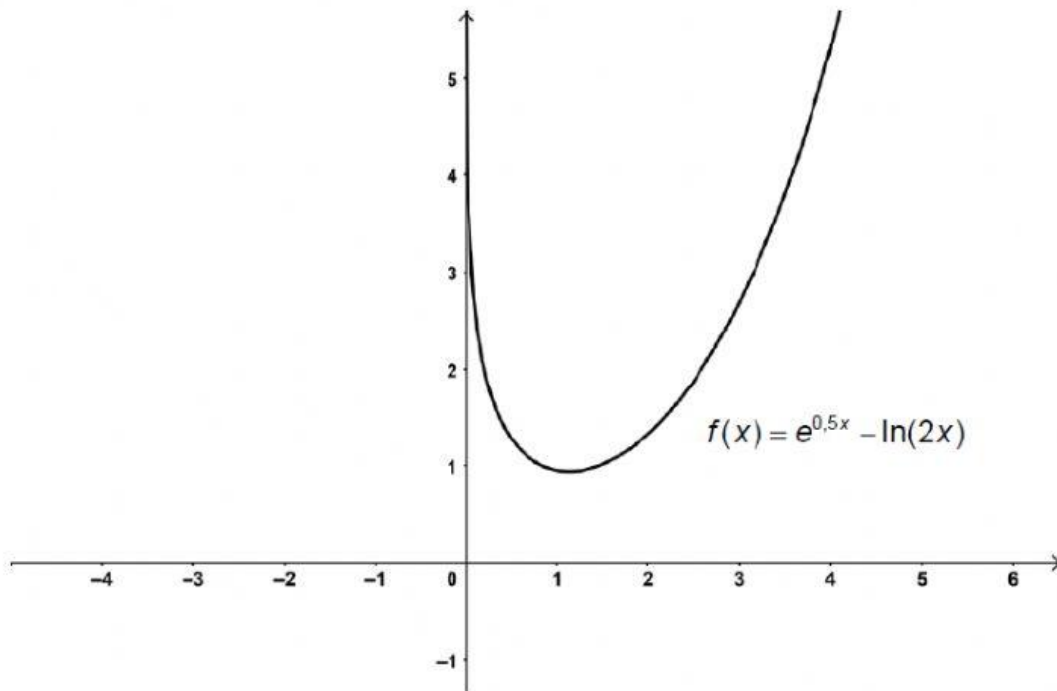

(a) Determine the values of p and q. (4)

(b) Using the graphs, or otherwise, solve: $|x - 2| + 3|x - 4| > 10$. (6)

(c) Determine $\int_1^7 g(x)\, dx$. (4)

QUESTION 10

Use Newton-Raphson iteration to find the turning point of the given function.
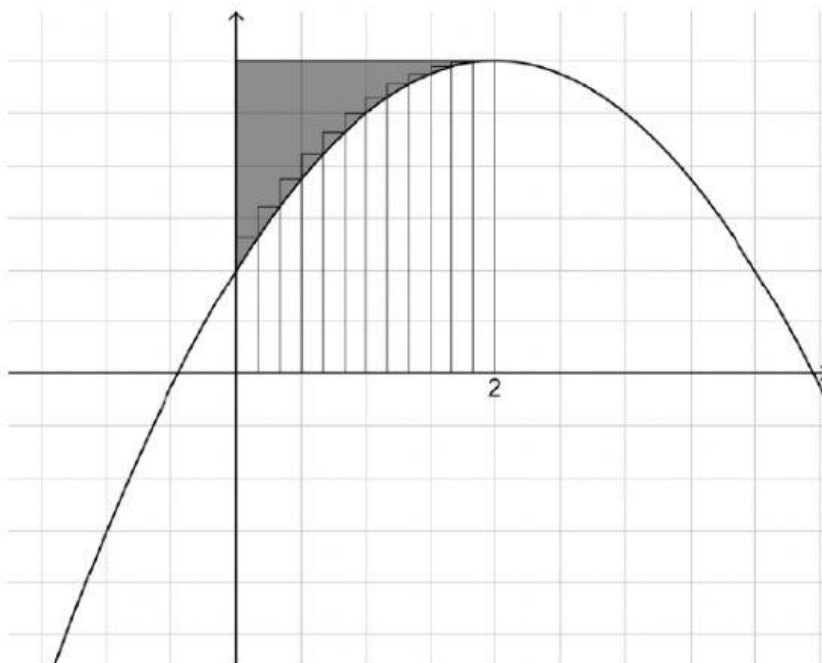
$$f(x) = e^{0.5x} - \ln(2x)$$

You should:

- Show the iterative formula you use.
- Use an initial approximation of $x = 2$.
- Show your first approximation to 5 decimal places.

QUESTION 11

11.1 When the area bounded by the curve f, the x-axis and the lines $x = 0$ and $x = 2$ is partitioned into n rectangles the area is given by:

$$A = -\frac{8}{3} - \frac{4}{3n^2} + 12 + \frac{4}{n}$$

If it is further given that $f(2) = 6$ then determine the shaded area, correct to 2 decimal places.

(6)

11.2 Determine:

(a) $\int x\left(3x^2 + 7\right)^3 \, dx$ (6)
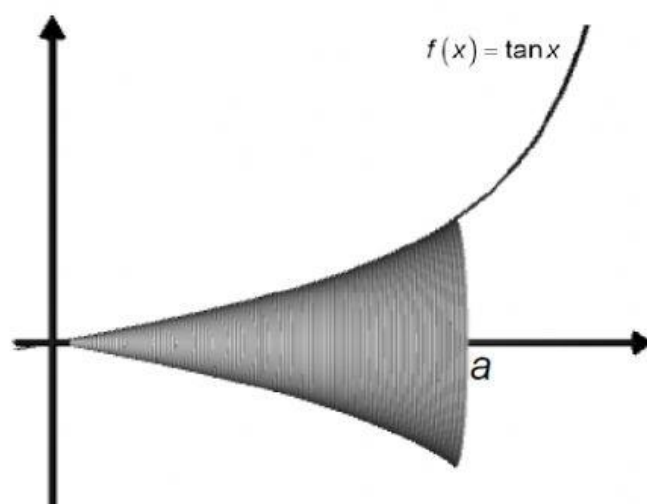
(b) $\int e^{2x} x\, dx$ (8)

(c) $\int \dfrac{3x-5}{x^2-2x-3}\, dx$ (10)

                                                                                [30]

QUESTION 12

The area bounded by the curve $f(x) = \tan x$, the x-axis, the line $x = 0$ and the line $x = a$, $a < \dfrac{\pi}{2}$ is rotated about the x-axis.

Give an expression for the volume in terms of *a*.