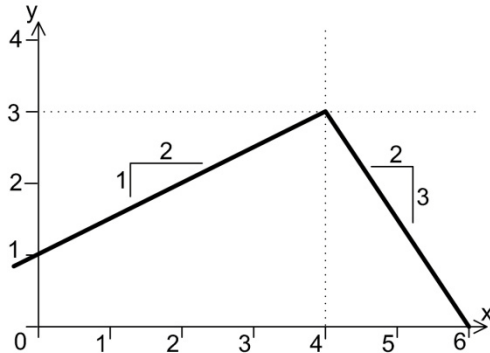The following quiz covers pre-requisite material for CE3202. Answer all questions to the best of your knowledge. *Do not use your calculator.* (**10 points total**)

1) Functions and their graphs (2 points):

Write an equation or set of equations that describes the following graphs between $x = 0$ and $x = 6$.

2) Integral calculus (3 points):

Find the first integral of $f(x)$ with respect to x. Find **both the definite and indefinite forms** of this integral. Use generic constants of integration (*e.g.*, C_1, C_2, *etc.*) and generic limits of integration (*e.g.*, x_1, x_2, *etc.*) as appropriate. Specify which integral form is which.

$$f(x) = (-x)(6x + 2)$$

3) Differential calculus (3 points):

Find the positive value of x for which the following function, $y(x)$, has its maximum value. Only consider positive values of x. Do not use trial-and-error.

$$y(x) = -2x^3 + 3x^2 + 12x - 4$$

4) ~~Linear algebra~~ **Basic matrix operations (2 points):**

Solve this:

$$\begin{bmatrix} 1 & -1 \\ 4 & 5 \end{bmatrix}\begin{bmatrix} 1 \\ 2 \end{bmatrix} =$$