

Solution

Quiz 1 (44372)

MATH 2B, CALCULUS, WINTER 2018

Please write your name and student ID number at the back of the paper. No calculators or phones allowed.

Problem 1.(5 points.) Find f , where f satisfies the following conditions:

$$f''(t) = \sin t + \cos t, f(0) = 3, f'(0) = 4$$

$$f'(t) = -\cos t + \sin t + C. \text{ Plug in } f'(0) = 4. \text{ we get}$$

$$f'(0) = -1 + 0 + C = 4 \Rightarrow C = 5$$

$$\therefore f'(t) = -\cos t + \sin t + 5.$$

$$f(t) = -\sin t - \cos t + 5t + D. \text{ Plug in } f(0) = 3. \text{ we get}$$

$$f(0) = 0 - 1 + 0 + D = 3 \Rightarrow D = 4$$

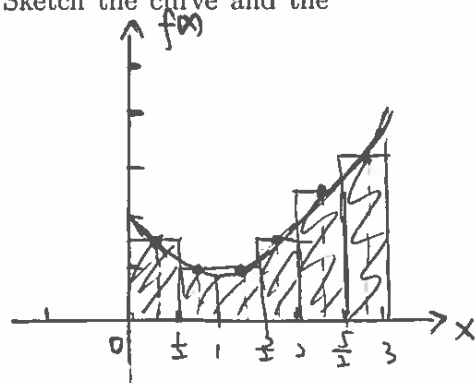
$$f(t) = -\sin t - \cos t + 5t + 4$$

Problem 2.(5 points.) Estimate the area under the graph of $f(x) = 1 + (x-1)^2$ from $x = 0$ to $x = 3$ using six rectangles and midpoints. Sketch the curve and the approximating rectangles.

$$\textcircled{1} \Delta x = \frac{3-0}{6} = \frac{1}{2}.$$

$$\text{Midpoints: } x_1 = \frac{1}{4}, x_2 = \frac{3}{4}, x_3 = \frac{5}{4}.$$

$$x_4 = \frac{7}{4}, x_5 = \frac{9}{4}, x_6 = \frac{11}{4}$$



$$\textcircled{2} f(x_1) = \frac{25}{16}, f(x_2) = \frac{17}{16}, f(x_3) = \frac{17}{16}$$

$$f(x_4) = \frac{25}{16}, f(x_5) = \frac{41}{16}, f(x_6) = \frac{65}{16}.$$

$$\textcircled{3} M_b = \sum_{i=1}^6 f(x_i) \Delta x$$

$$= \frac{1}{2} \left(\frac{25}{16} + \frac{17}{16} + \frac{17}{16} + \frac{25}{16} + \frac{41}{16} + \frac{65}{16} \right)$$

$$= \frac{1}{2} \times \frac{1}{16} (25 + 17 + 17 + 25 + 41 + 65)$$

$$= \frac{95}{16} (= 5.9375).$$