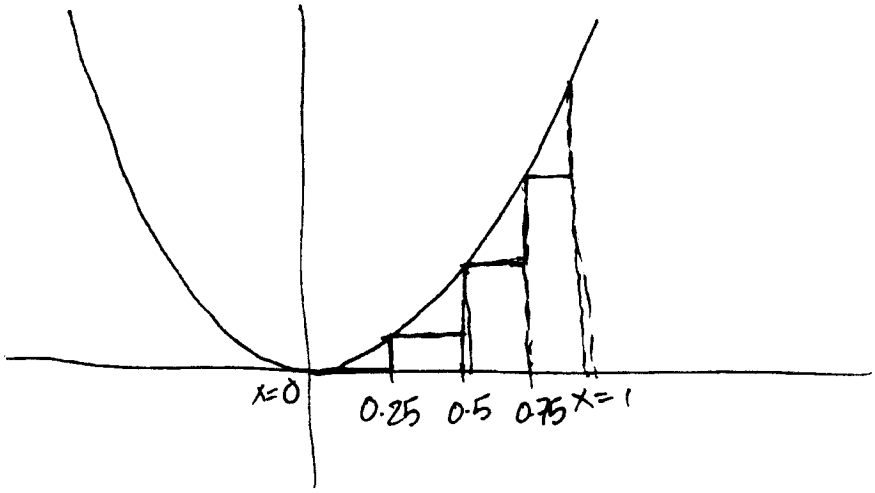
HW 2 Solutions

MAT 17B.

Section 6.1

1.



1. Divide into 4 subintervals $[0, 0.25, 0.5, 0.75, 1]$

2. Using left-endpts, heights of the rectangles are $0^2, (0.25)^2, (0.5)^2 + (0.75)^2$.

3. Adding all the areas:

$$0^2 \times 0.25 + (0.25)^2 \times 0.25 + (0.5)^2 \times 0.25 + (0.75)^2 \times 0.25$$

$$= \boxed{0.21875}$$

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5. $\sum_{k=1}^{4} \sqrt{k} = \sqrt{1} + \sqrt{2} + \sqrt{3} + \sqrt{4}$

6. $\sum_{k=3}^{5} (k-1)^2 = (3-1)^2 + (4-1)^2 + (5-1)^2 = 2^2 + 3^2 + 4^2$

7. $\sum_{k=2}^{6} 3^k = 3^2 + 3^3 + 3^4 + 3^5 + 3^6$

13. $\sum_{k=1}^{n} \left(\frac{k}{n}\right)^2 \frac{1}{n} = \left(\frac{1}{n}\right)^2 \frac{1}{n} + \left(\frac{2}{n}\right)^2 \frac{1}{n} + \left(\frac{3}{n}\right)^2 \frac{1}{n} + \ldots + \left(\frac{n}{n}\right)^2 \frac{1}{n}$

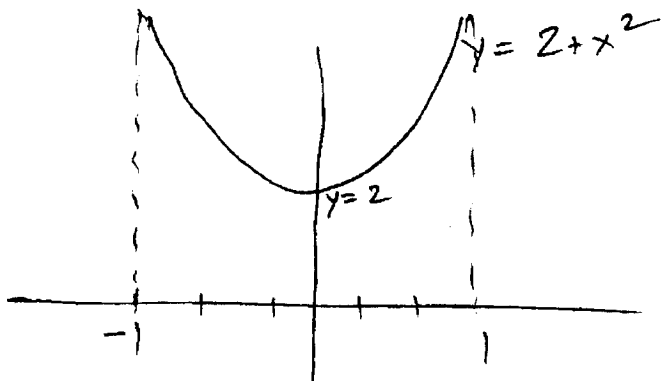
20. $\frac{1}{1} + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \ldots + \frac{1}{2^n}$

$= \sum_{k=1}^{n} \frac{1}{2^k}$

21. $1 + q + q^2 + q^3 + q^4 + \ldots + q^{n-1}$

$= \sum_{k=0}^{n-1} q^k$

34. $\int_{-1}^{1} (2 + x^2)\, dx$



1. Divide $[-1, 1]$ into 5 equal subintervals:

$[-1, -0.6, -0.2, 0.2, 0.6, 1]$

5 equal subintervals

2. Use right endpts to get height of rectangles from the function value $2 + x^2$:

First rectangle over $[-1, -0.6]$ has height $2+(-0.6)^2$

2nd " " $[-0.6, -0.2]$ " " $2+(-0.2)^2$

3rd " " $[-0.2, 0.2]$ " " $2+(0.2)^2$

4th " " $[0.2, 0.6]$ " " $2+(0.6)^2$

5th " " $[0.6, 1]$ " " $2+(1)^2$

3. Adding all areas of the 5 rectangles:

$$(2+(-0.6)^2)\times 0.4 \quad \leftarrow \text{base of each rectangle}$$
$$+ (2+(-0.2)^2)\times 0.4$$
$$+ (2+(0.2)^2)\times 0.4$$
$$+ (2+(0.6)^2)\times 0.4$$
$$+ (2+1^2)\times 0.4$$
$$= \boxed{4.72}$$

36. 1. Divide $[-1, 2]$ into 3 equal subintervals:

$$[-1, 0, 1, 2].$$

2. Use midpts of the subintervals to get heights of rectangles with the function value e^{-x}.

Midpts: $[-1, 0] \rightarrow -0.5$

$[0, 1] \rightarrow 0.5$

$[1, 2] \rightarrow 1.5$

First rectangle over $[-1, 0]$ has height $e^{-(-0.5)} = e^{0.5}$

2nd rectangle " $[0, 1]$ " " $e^{-(0.5)} = e^{-0.5}$

3rd " " $[1, 2]$ " " $e^{-(1.5)} = e^{-1.5}$

3. Adding all the areas of the 3 rectangles:

$e^{0.5} \times (1)$ ← base of each rectangle

$+ e^{-0.5} \times 1$

$+ e^{-1.5} \times 1$

$= \boxed{2.47838}$