

<b>Complete solutions to Exercise 8(a)</b>
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1. We apply (8.1) in each case:

$$(a) \int x dx = \int \underset{=x}{x^1} dx = \frac{x^{1+1}}{1+1} + C = \frac{x^2}{2} + C$$

$$(b) \int u^2 du = \frac{u^3}{3} + C \quad (c) \int z^3 dz = \frac{z^4}{4} + C$$

$$(d) \int t^{1/2} dt = \frac{t^{1/2+1}}{1/2+1} + C = \frac{t^{3/2}}{3/2} + C = \frac{2t^{3/2}}{3} + C$$

$$(e) \int \omega t d(\omega t) \underset{\substack{\text{by (8.1) with} \\ u=\omega t \text{ and } n=1}}{=} \frac{(\omega t)^2}{2} + C \quad (f) \int 3dt = 3 \int dt = 3t + C$$

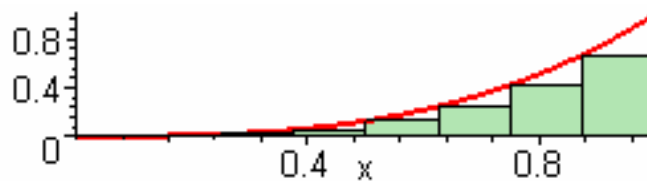
$$(g) \int t^{-2} dt = \frac{t^{-2+1}}{-2+1} + C = -t^{-1} + C$$

$$(h) \int x^{-1/2} dx = \frac{x^{-1/2+1}}{-1/2+1} + C = \frac{x^{1/2}}{1/2} + C = 2x^{1/2} + C$$

2. The following are the MAPLE commands:

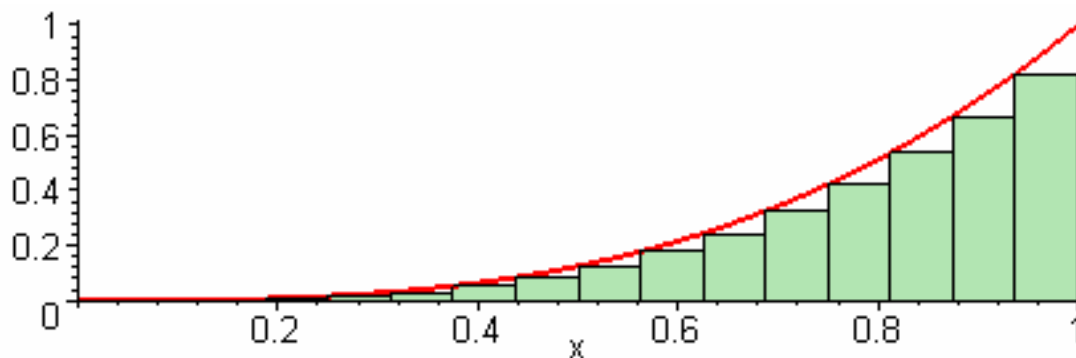
> **with(student):**

> **leftbox(x^3,x=0..1,8);**



> **evalf(leftsum(x^3,x=0..1,8));**  
0.1914062500

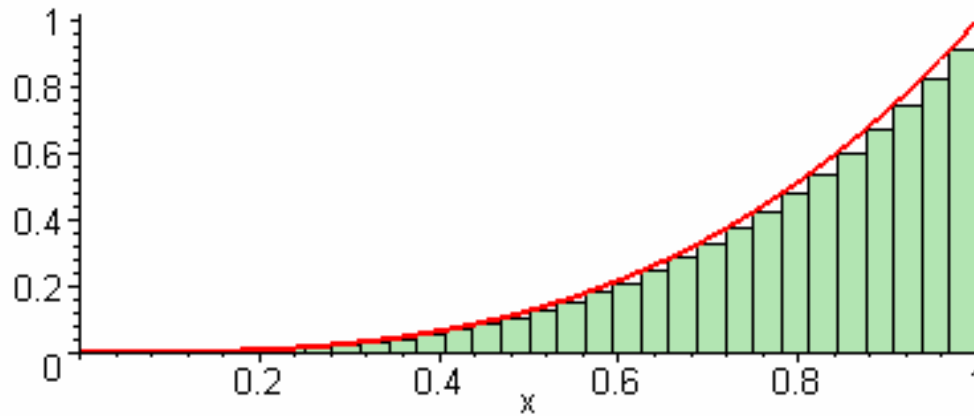
> **leftbox(x^3,x=0..1,16);**



> **evalf(leftsum(x^3,x=0..1,16));**  
0.2197265625

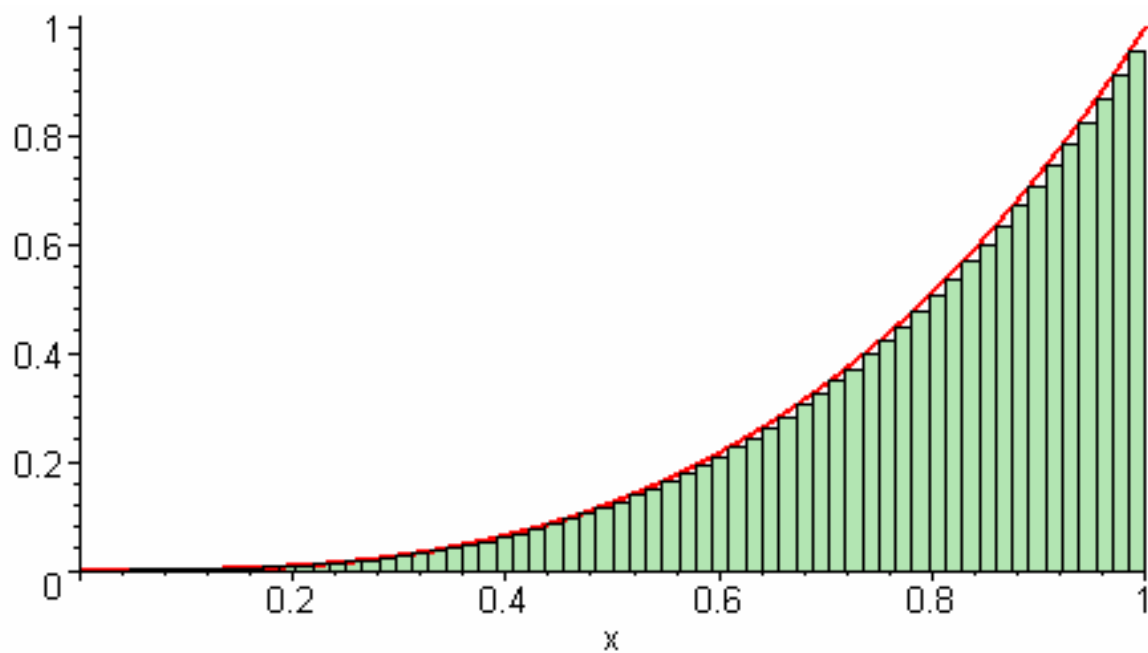
$$(8.1) \quad \int u^n du = u^{n+1}/n+1$$

```
> leftbox(x^3,x=0..1,32);
```



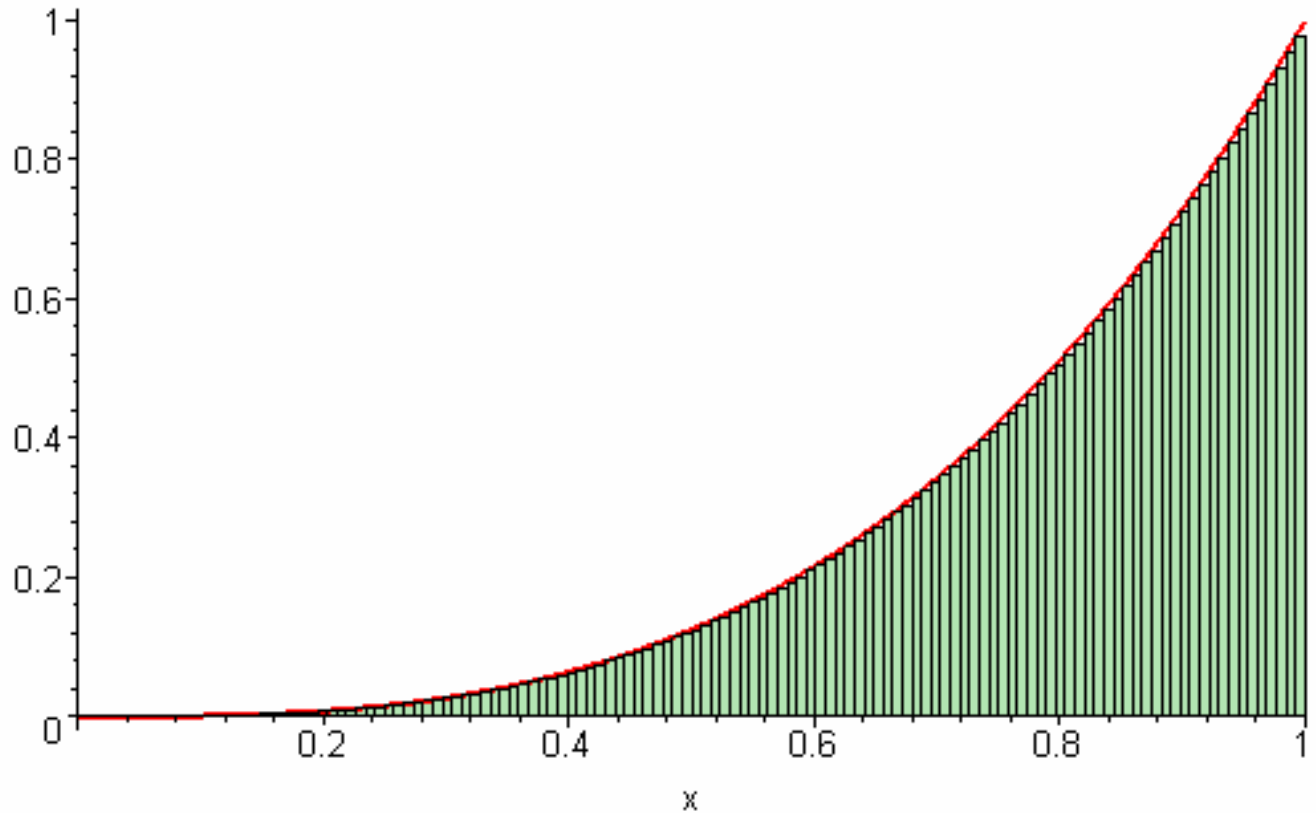
```
> evalf(leftsum(x^3,x=0..1,32));  
0.2346191406
```

```
> leftbox(x^3,x=0..1,64);
```



```
> evalf(leftsum(x^3,x=0..1,64));  
0.2422485352
```

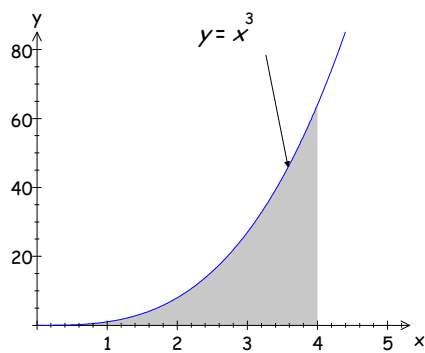
```
> leftbox(x^3,x=0..1,128);
```



```
> evalf(leftsum(x^3,x=0..1,128));
0.2461090088
```

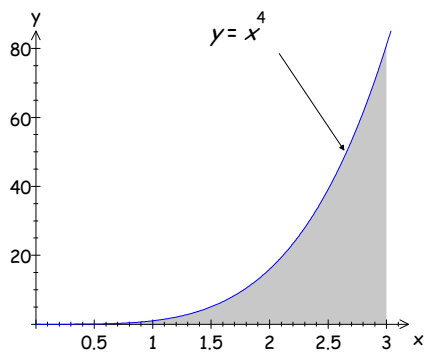
```
> evalf(int(x^3,x=0..1));
0.2500000000
```

3. (a) We have



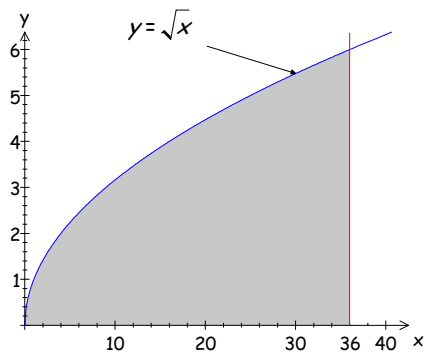
$$\text{Area} = \int_0^4 x^3 dx = \left[ \frac{x^4}{4} \right]_0^4 = \frac{1}{4} [4^4 - 0^4] = 64$$

(b) Similarly we have



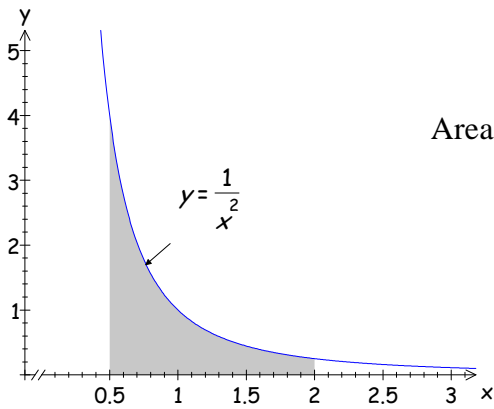
$$\begin{aligned} \text{Area} &= \int_0^3 x^4 dx = \left[ \frac{x^5}{5} \right]_0^3 = \frac{1}{5} [3^5 - 0^4] = 48.6 \end{aligned}$$

(c) Again we have:



$$\text{Area} = \int_0^{36} x^{1/2} dx = \left[ \frac{x^{3/2}}{3/2} \right]_0^{36} = \frac{2}{3} [36^{3/2} - 0^{3/2}] = 144$$

(d) We have



$$\text{Area} = \int_{0.5}^2 x^{-2} dx = \left[ \frac{x^{-1}}{-1} \right]_{0.5}^2 = - \left[ \frac{1}{2} - 2 \right] = \frac{3}{2}$$