Integration by parts

UNIVERSITY OF TORONTO

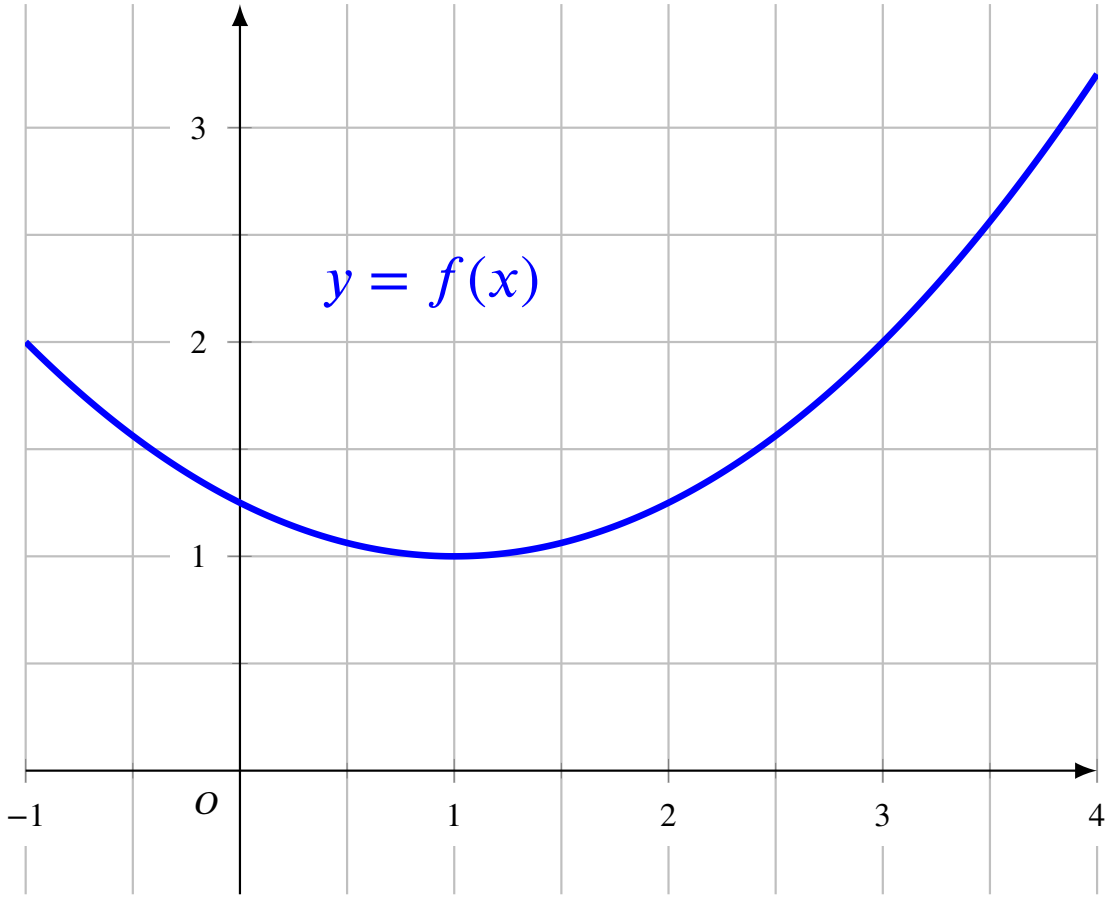
January 28th, 2019

For next lecture

For Wednesday (Jan 30), watch the videos:

- Integration of trig functions: 9.10, (9.11), (9.12)
- Integration of rational functions: 9.15, (9.16), (9.17)

Parts from a graph



Estimate:

1. $\int_0^1 f(x)dx$
2. $\int_0^1 f'(x)dx$
3. $\int_0^3 x\, f'(x)dx$

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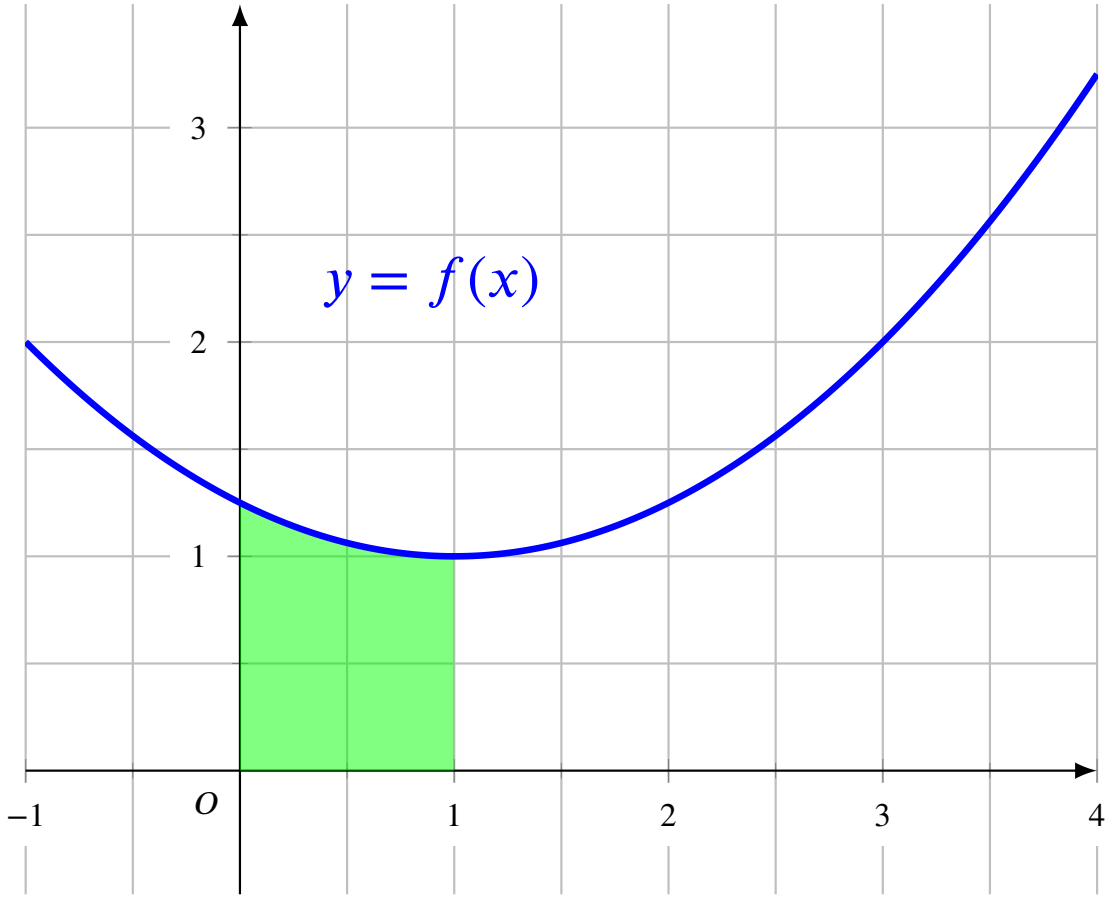

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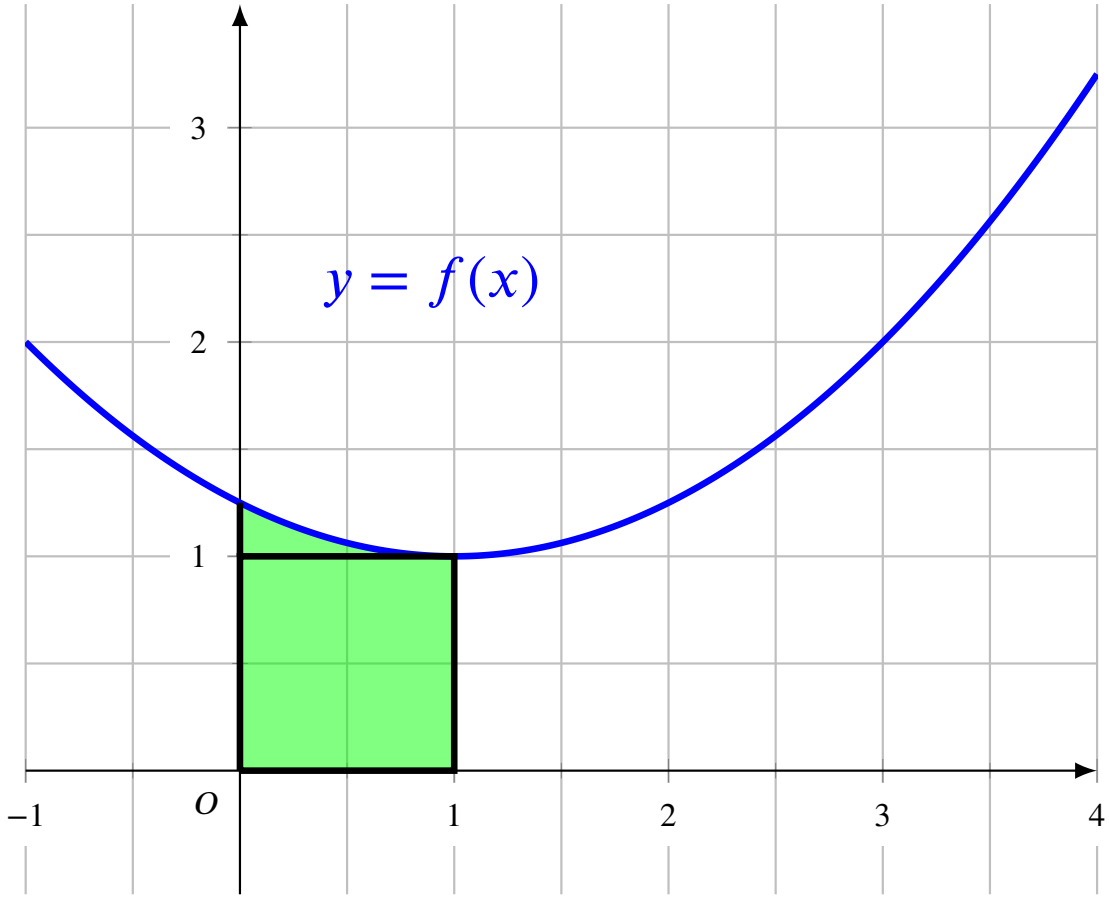

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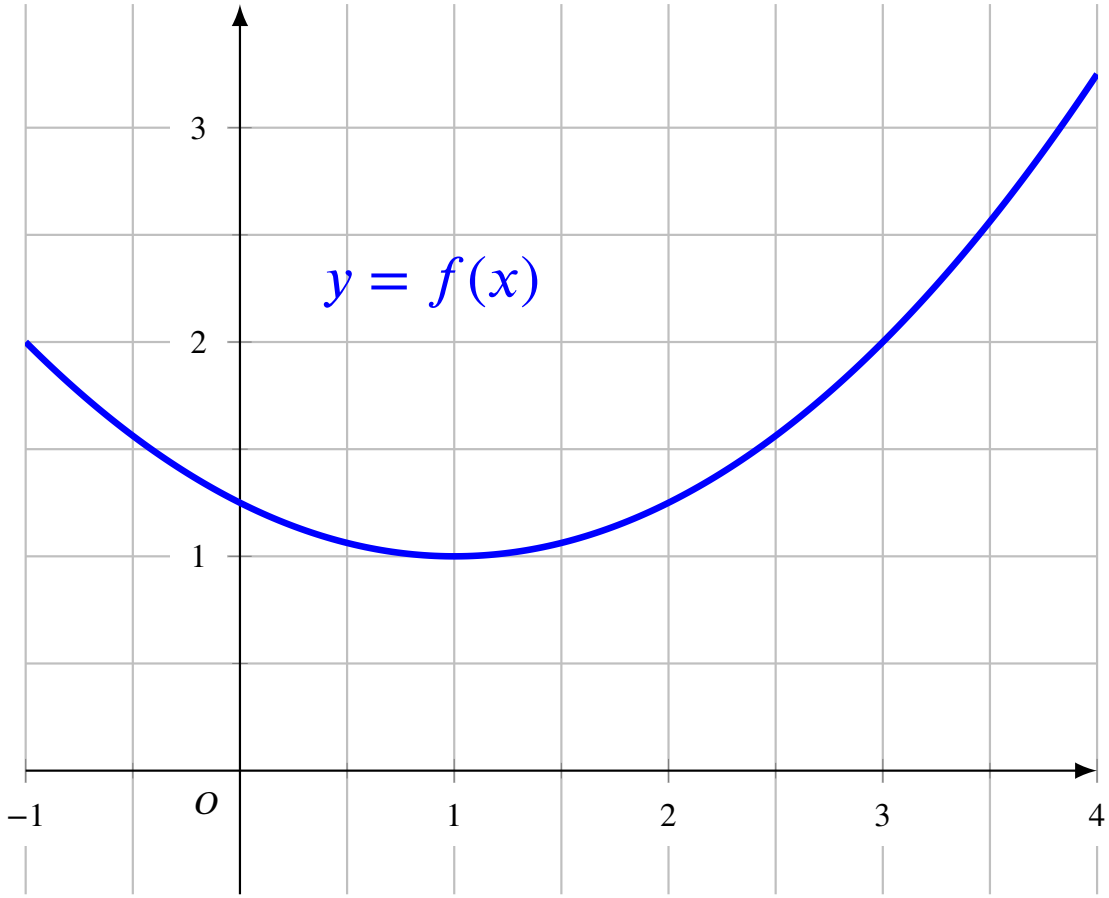

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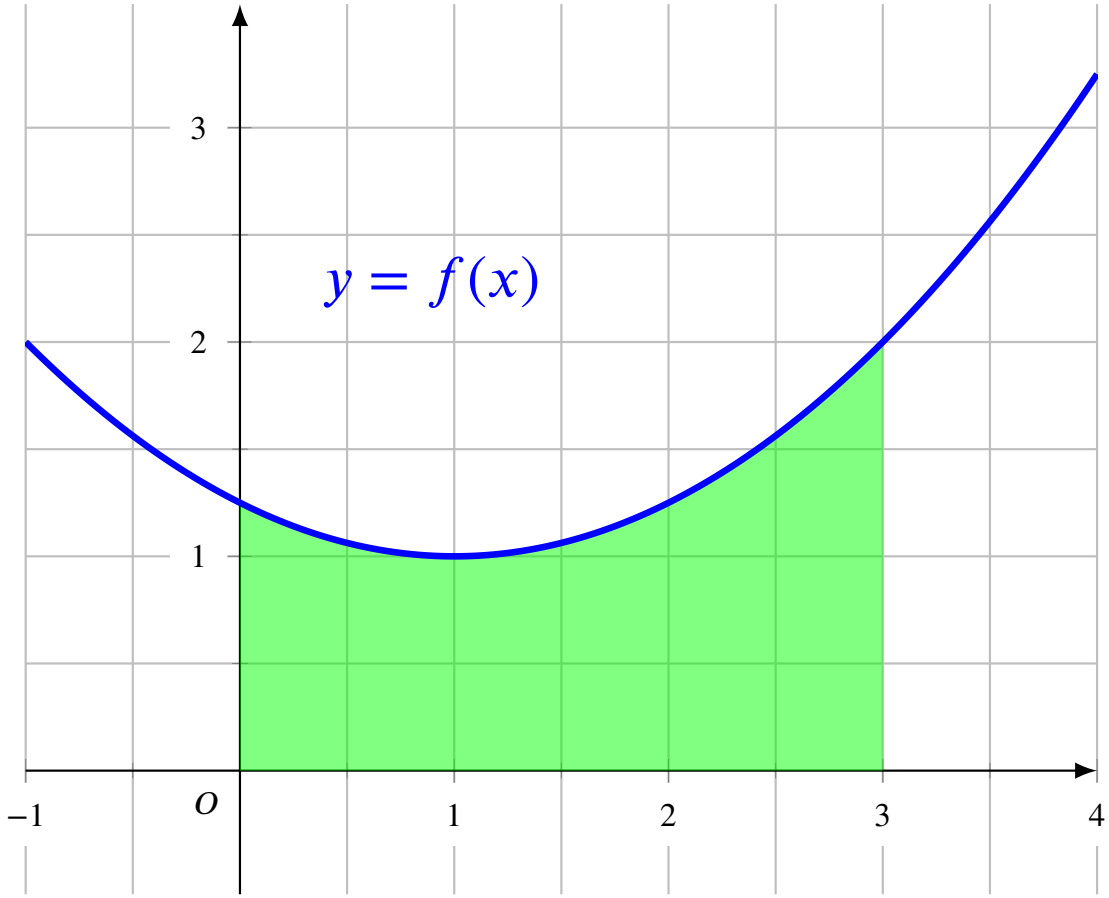

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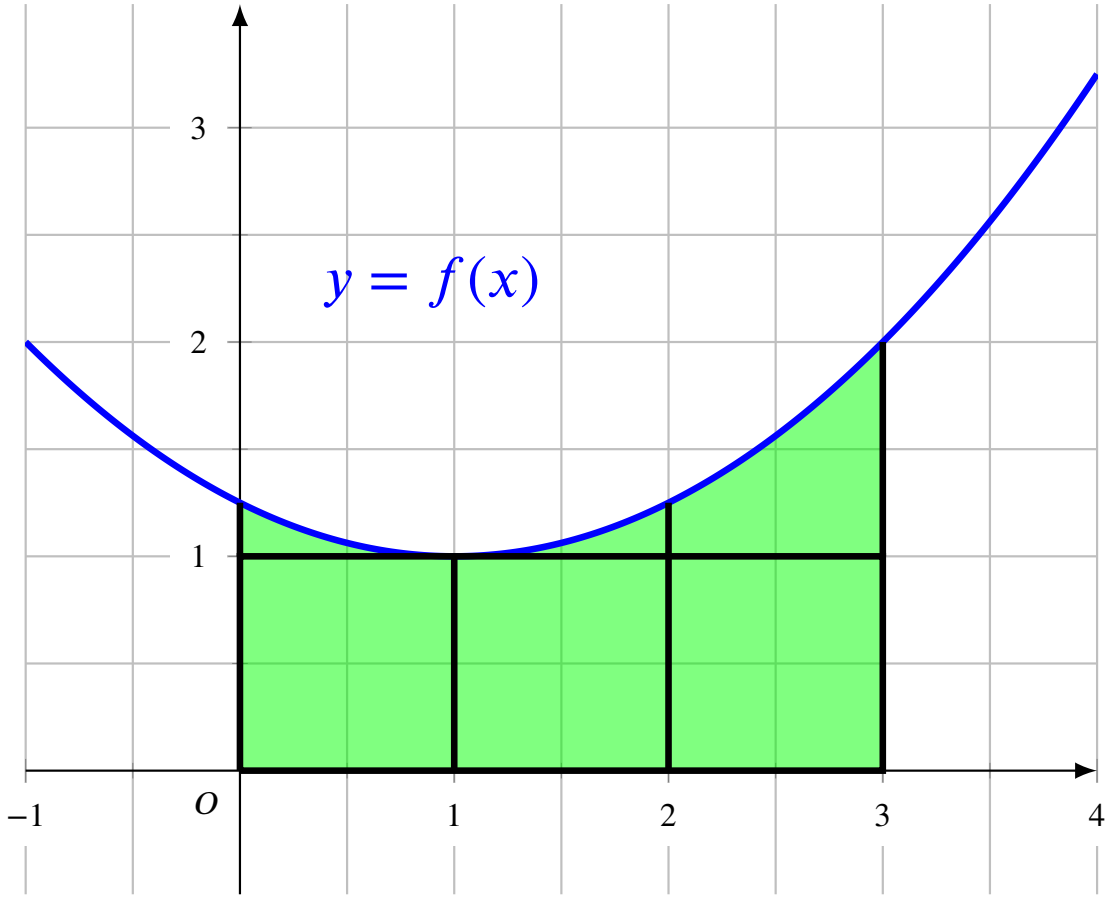

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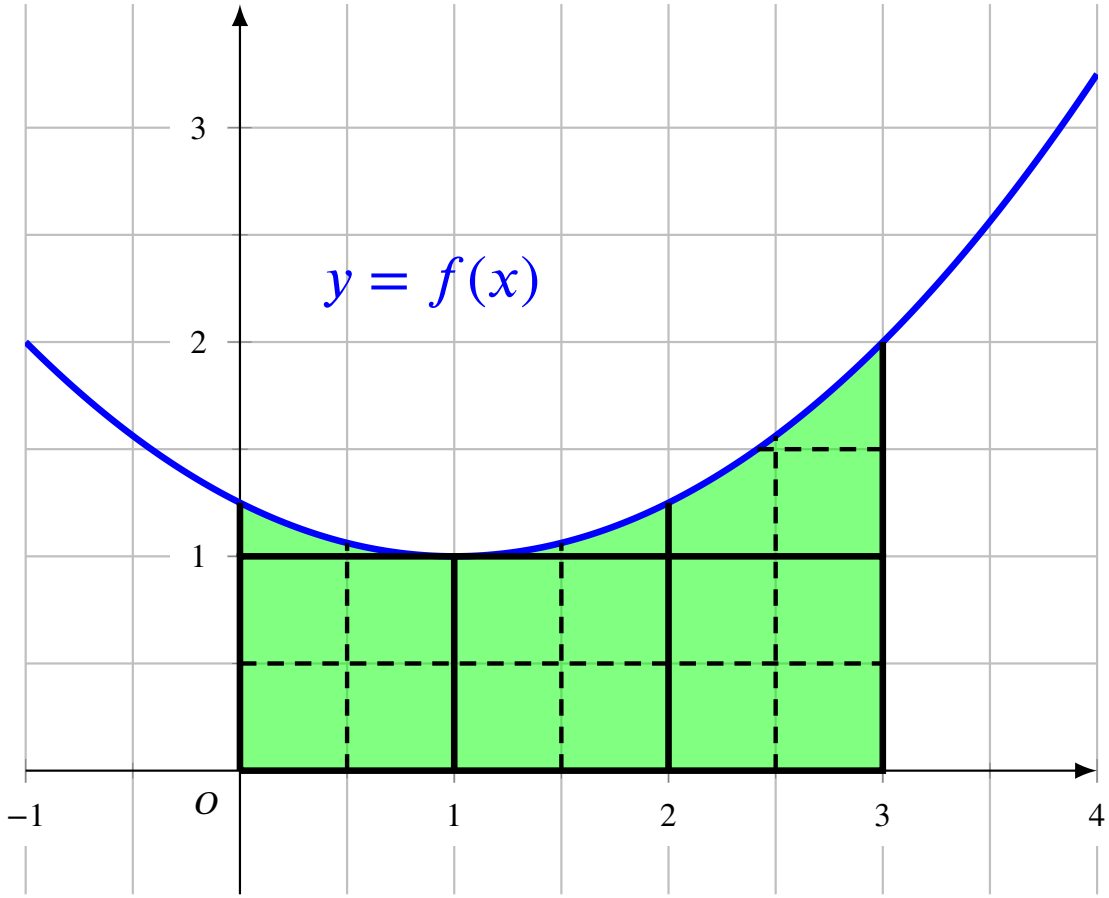

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Computation practice: Integration by parts

Compute:

1. $\int x e^{-2x} \, dx$
2. $\int x^2 \sin x \, dx$
3. $\int \ln x \, dx$
4. $\int x \arctan x \, dx$
5. $\int \sin \sqrt{x} \, dx$

Exp-trig antiderivative

Compute

$$\int e^{ax} \sin(bx)\, dx$$

The error function - *Homework*

The following function is tabulated.

$$E(x) = \int_0^x e^{-t^2}\,dt.$$

Write the following quantities in terms of E:

1. $\displaystyle\int_1^2 e^{-t^2}\,dt$
2. $\displaystyle\int_0^x t^2 e^{-t^2}\,dt$
3. $\displaystyle\int_0^x e^{-2t^2}\,dt$
4. $\displaystyle\int_0^1 e^{-t^2+6t}\,dt$
5. $\displaystyle\int_{x_1}^{x_2} e^{-\frac{(t-\mu)^2}{\sigma^2}}\,dt$
6. $\displaystyle\int_0^x \frac{e^{-t}}{\sqrt{t}}\,dt$

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