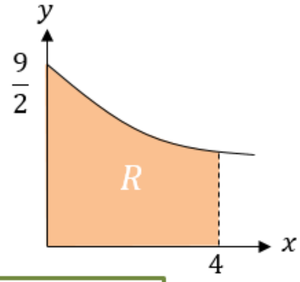
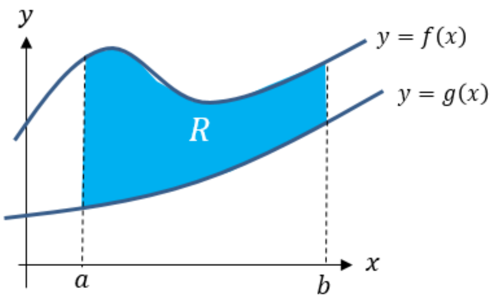
Finding Areas

You're already familiar with the idea that definite integration gives you the (signed) area bound between the curve and the x-axis.
Given your expanded integration skills, you can now find the area under a greater variety of curves.

[Textbook] The diagram shows part of the curve $y = \frac{9}{\sqrt{4+3x}}$
The region R is bounded by the curve, the x-axis and the lines $x = 0$ and $x = 4$, as shown in the diagram. Use integration to find the area of R.



Skill #9: Area between two curves

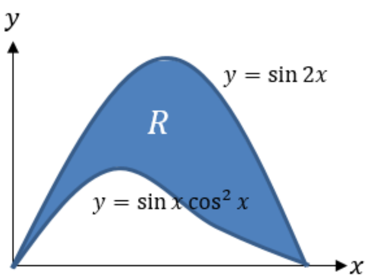


Fro Tip: Ensure you have top curve minus bottom curve.

(This was presented in my Year 1 slides as an 'alternative method')
The areas under the two curves are $\int_a^b f(x)\,dx$ and $\int_a^b g(x)\,dx$. It therefore follows the area between them (provided the curves don't overlap) is:

$$R = \int_a^b f(x)\,dx - \int_a^b g(x)\,dx$$
$$= \int_a^b \big(f(x) - g(x)\big)\,dx$$

[Textbook] The diagram shows part of the curves $y = \sin 2x$ and $y = \sin x \cos^2 x$ where $0 \le x \le \frac{\pi}{2}$. The region R is bounded by the two curves. Use integration to find the area of R.



Test Your Understanding

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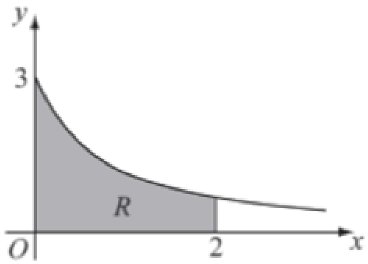

Figure 1

Figure 1 shows part of the curve $y = \dfrac{3}{\sqrt{(1+4x)}}$. The region R is bounded by the curve, the x-axis, and the lines $x = 0$ and $x = 2$, as shown shaded in Figure 1.

(*a*) Use integration to find the area of R. **(4)**