Answers: Introduction to integration

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Summary

Answers to questions relating to the guide on introduction to integration.

*These are the answers to* [*Questions: Introduction to integration*](../questions/qs-introtointegration.qmd)*.*

**Please attempt the questions before reading these answers!**

## Q1

1.1. $ ∫x^{4} dx=\frac{1}{5}x^{5}+C$.

1.2. $ ∫2x dx=x^{2}+C$.

1.3. $ ∫7x^{5} dx=\frac{7}{6}x^{6}+C$.

1.4. $ ∫−5 dt=−5t+C$.

1.5. $ ∫\frac{3}{y^{3}} dy=−\frac{3}{2}y^{−2}+C$.

1.6. $ ∫6x^{−4} dx=−2x^{−3}+C$.

1.7. $ ∫−\frac{2}{x^{5}} dx=\frac{1}{2}x^{−4}+C$.

1.8. $ ∫\frac{8}{3x^{6}} dx=−\frac{8}{15}x^{−5}+C$.

1.9. $ ∫−\frac{7}{2z^{7}} dz=\frac{7}{12}z^{−6}+C$.

1.10. $ ∫x^{1/3} dx=\frac{3}{4}x^{4/3}+C$.

1.11. $ ∫3t^{−2/3} dt=9t^{1/3}+C$.

1.12. $ ∫\frac{4x^{1/4}}{3} dx=\frac{16}{15}x^{5/4}+C$.

1.13. $ ∫\frac{2}{5x^{1/3}} dx=\frac{3}{5}x^{2/3}+C$.

1.14. $ ∫\frac{5}{6y^{−4/3}} dy=\frac{5}{14}y^{7/3}+C$.

## Q5

2.1. $ ∫e^{2x} dx=\frac{1}{2}e^{2x}+C$

2.2. $ ∫−3e^{−3x} dx=e^{−3x}+C$

2.3. $ ∫2e^{11x} dx=\frac{2}{11}e^{11x}+C$

2.4. $ ∫\frac{4}{x} dx=4ln\left|x\right|+C$

2.5. $ ∫−\frac{5}{3x} dx=−\frac{5}{3}ln\left|x\right|+C$

2.6. $ ∫cos\left(x\right) dx=sin\left(x\right)+C$.

2.7. $ ∫sin\left(2x\right) dx=−\frac{1}{2}cos\left(2x\right)+C$.

2.8. $ ∫\frac{5}{6}cos\left(x\right) dx=\frac{5}{6}sin\left(x\right)+C$.

2.9. $ ∫cos\left(3x\right) dx=\frac{1}{3}sin\left(3x\right)+C$.

2.10. $ ∫sin\left(\frac{x}{3}\right) dx=−3cos\left(\frac{x}{3}\right)+C$.

## Q3

3.1. $ \int\_{1}^{4}2 dx=6$

3.2. $ \int\_{−2}^{2}3x dx=0$

3.3. $ \int\_{2}^{4}2x^{3} dx=120$

3.4. $ \int\_{1}^{27}\frac{4}{\sqrt[3]{x}} dx=48$

3.5. $ \int\_{0}^{ln\left(3\right)}4e^{x} dx=8$

3.6. $ \int\_{0}^{5}e^{−3x} dx=\frac{1}{3}\left(1−e^{−15}\right)$

3.7. $ \int\_{1}^{2}−4e^{4x} dx=e^{4}\left(1−e^{4}\right)$

3.8. $ \int\_{1}^{2}\frac{2}{x} dx=2ln\left(2\right)$

3.9. $ \int\_{1}^{e^{3}}−\frac{4}{x} dx=−12$

3.10. $ \int\_{e^{3}}^{e^{9}}\frac{9}{5x} dx=\frac{54}{5}$

3.11. $ \int\_{0}^{π/2}sin\left(x\right) dx=1$

3.12. $ \int\_{0}^{π}cos\left(x\right) dx=0$

3.13. $ \int\_{0}^{π/4}sin\left(2x\right) dx=\frac{1}{2}$

3.14. $ \int\_{0}^{π/6}cos\left(2x\right) dx=\frac{\sqrt{3}}{4}$

3.15. $ \int\_{−π/4}^{0}sin\left(3x\right) dx=−\frac{1}{3}−\frac{1}{3\sqrt{2}}$

## Version history and licensing

v1.0: initial version created 05/25 by Donald Campbell as part of a University of St Andrews VIP project.

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