Mathematics in Life Sciences **Winter Semester 2025**

List of Exercises 7

1. Calculate the following indefinite integrals.

1. $\int (x^2 + \sin(x) + e^x)\, dx$	2. $\int (2x + \cos(3x) + \ln(x))\, dx$
3. $\int (\frac{4x+5}{x})\, dx$	4. $\int (\frac{10x+5}{x^2})\, dx$
5. $\int (\frac{e^x+1}{e^x})\, dx$	6. $\int (\cos(x) + 4x^5 + \ln(x))\, dx$
7. $\int (\frac{x^2-2x+1}{x-1})\, dx$	8. $\int (\sqrt{8x})\, dx$
9. $\int ((1 + \frac{3}{x})^2)\, dx$	

2. Calculate the following definite integrals.

1. $\int_0^1 (x^2 + \sin(x))\, dx$	2. $\int_{-\pi}^{\pi} (2x + \cos(x))\, dx$
3. $\int_1^2 (e^x + \ln(x))\, dx$	4. $\int_0^{\pi/2} (\sin(x) + \cos(x))\, dx$
5. $\int_{-1}^1 (x^2 + 1)\, dx$	6. $\int_0^{\pi} (\sin(x) + x)\, dx$
7. $\int_1^3 (2x + e^{-x})\, dx$	8. $\int_{-\pi/4}^{\pi/4} (\tan(x) + \sec^2(x))\, dx$
9. $\int_0^1 (\sqrt{x} + \cos(\pi x))\, dx$	10. $\int_{-2}^2 (x^3 + e^{2x})\, dx$

3. Evaluate the following integrals using the substitution method.

1. $\int x e^{x^2}\, dx$	2. $\int_0^1 \frac{2x}{(1+x^2)^2}\, dx$
3. $\int \frac{\sin(x)}{\cos^2(x)}\, dx$	4. $\int_1^e \frac{\ln(x)}{x}\, dx$
5. $\int \frac{x}{\sqrt{4+x^2}}\, dx$	6. $\int_0^{\pi/3} \sin(2x)\cos(2x)\, dx$
7. $\int \frac{2}{x\ln(x)}\, dx$	8. $\int_0^{\pi} \frac{\sin(x)}{\cos^2(x)}\, dx$
9. $\int 3(8x-1)e^{4x^2-x}\, dx$	10. $\int_1^e \frac{\sqrt{\ln(x)}}{x}\, dx$

4. Calculate the following integrals using integration by parts.

1. $\int x\ln(x)\, dx$	2. $\int_0^1 e^x \cos(x)\, dx$
3. $\int x^2 e^x\, dx$	4. $\int_1^2 \frac{\ln(x)}{x^2}\, dx$
5. $\int e^{2x}\sin(3x)\, dx$	6. $\int_0^{\pi} x\cos(x)\, dx$
7. $\int x^2\cos(x)\, dx$	8. $\int_1^e x e^{5x}\, dx$

5. Evaluate $\int_{-1}^{1} \sqrt{1-x^2}dx$. (Hint: Try to sketch the function to understand what kind of function you are trying to integrate)