Exercise Session 10

1. For which values of p does the integral $\int_0^a \frac{1}{x^p} dx$ converge? Assume that $a > 0$.

2. Check if the following integrals converge or diverge.

   - $\int_1^{+\infty} \frac{\sin^2 x}{x(\sqrt{x}+1)} dx$
   - $\int_1^e \frac{dx}{x(\log x)^2}$

3. Compute the following integrals or show that they are divergent.

   - $\int_0^{+\infty} \lambda e^{-\lambda x} dx$
   - $\int_0^{+\infty} \lambda x e^{-\lambda x} dx$
   - $\int_0^{+\infty} \lambda x^2 e^{-\lambda x} dx$
   - $\int_{-\infty}^{+\infty} x e^{-0.5x^2} dx$
   - $\int_0^4 \frac{dx}{\sqrt{4-x}}$
   - $\int_1^2 \frac{dx}{\sqrt[3]{x-1}}$
   - $\int_0^1 \log x dx$