Maths problems Set 0.1 (calculus)

August 2015

1. Evaluate the following integral:

$$\int \sin^2 x \, \mathrm{d}x$$

2. Evaluate the integral:

$$\int \log_e x \, \mathrm{d}x$$

3. What are the values of the following integrals?

(a) $\displaystyle\int_0^t \frac{1}{x^2} \, \mathrm{d}x, \quad \text{as } t \to \infty$

(b) $\displaystyle\int_0^t \frac{1}{\sqrt{1-x^2}} \, \mathrm{d}x, \quad \text{as } t \to 1$

4. Integrate $e^{ax} \cos bx$ with respect to x

5. Evaluate the integral

$$\int \frac{x}{(3+x)^2} \, \mathrm{d}x$$

6. (a) differentiate and (b) integrate a^x with respect to x

7. Find the values of x corresponding to the maximum and minimum of the function $y = x^2 e^x$ and distinguish between them

8. If $x = \dfrac{t^2}{1+t^3}$ and $y = \dfrac{t^3}{1+t^3}$, find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$

9. Differentiate $\sin^{-1} x$ with respect to x

10. Find the integral:

$$\int \frac{1}{9-4x^2} \, \mathrm{d}x$$