EXERCISE SHEET : ANTIDERIVATIVES

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1. Compute the antiderivative of the following functions :

i) $f(x) = 5x^4 + 4x^5$

ii) $f(x) = x + 12x^2$

iii) $f(x) = \frac{1}{\sqrt{x}}$

iv) $f(x) = (\sqrt{x})^3$

v) $f(x) = \frac{x^{\frac{1}{3}}}{x^{\frac{2}{3}}}$

vi) $f(x) = 2\sin(x) + \sin(2x)$

vii) $f(x) = \sin(x)\cos(x)$

viii) $f(x) = \sin^2(x)\cos(x)$

ix) $f(x) = 0$

x) $f(x) = \frac{1}{2}e^{-4x} + \sin(x)$

xi) $f(x) = \frac{3x^2+2}{x^2}$

xii) $f(x) = e^x + e^{-x}$

2. Find a function $f(x)$ such that $f'(x) = x^{-3}$ and $f(1) = 1$.

3. Find a function $f(x)$ such that $f'(x) = \frac{2}{x^2} - \frac{x^2}{2}$ and $f(1) = 0$

4. Find a function $f(x)$ such that $f''(x) = 8e^{-2x} - \sin(x)$

5. True or False ? Decide whether the following statements are true or false.

i) If $g(x)$ is the antiderivative of $f(x)$, then $2g(x)$ is the antiderivative of $2f(x)$.

ii) If $g(x)$ is the antiderivative of $f(x)$, then $g(2x)$ is the antiderivative of $f(2x)$.

iii) If $g(x)$ is the antiderivative of $f(x)$, then $g(x) + 1$ is the antiderivative of $f(x) + 1$.

iv) If $g(x)$ is the antiderivative of $f(x)$, then $g(x)^2$ is the antiderivative of $f(x)^2$.