Answer the problems on **separate** paper. You do <u>not</u> need to rewrite the problem statements on your answer sheets. Do your own work. Show **all relevant steps** which lead to your solutions. Attach this question sheet to the <u>front</u> of your answer sheets.

1.   For each of the following functions find the derivative:

    a. $a(x) = -3x^2 + x - \dfrac{2}{x^4}$ b. $b(x) = \dfrac{x^2 - 5}{x^2 + 2}$

    c. $c(x) = \cos^3(1 - 4x)$ d. $d(x) = e^{2x} \tan x$

    e. $e(x) = (x + 3)e^{1-3x}$ f. $f(x) = (x + 1)\ln(x + 1)$

    g. $g(x) = \sin^{-1}(1 - 2x)$ h. $h(x) = x^2 - 2^x$

2.   Find $\dfrac{dy}{dx}$ by implicit differentiation: $x^3 + 2xy + y^4 = x - 1$

3.   For each of the following find the indefinite integral:

    a. $\displaystyle\int (4 - 3x^{\frac{1}{2}})\, dx$ b. $\displaystyle\int \dfrac{x^2 - x + 2}{x^3}\, dx$

    c. $\displaystyle\int \dfrac{5\, dx}{3(x^2 + 1)}$ d. $\displaystyle\int x\sqrt{6 - x^2}\, dx$

    e. $\displaystyle\int \dfrac{\ln(x + 1)}{x + 1}\, dx$