

Answer the problems on **separate** paper. You do not 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 front of your answer sheets.

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

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

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

c. $c(x) = \sin^4(1 - 3x)$

d. $d(x) = e^{-x} \tan x$

e. $e(x) = (x - 2)e^{1+2x}$

f. $f(x) = (x - 2)\ln(x - 2)$

g. $g(x) = \tan^{-1}(1 + 3x)$

h. $h(x) = x^3 - 3^x$

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

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

a. $\int (3 - 6x^{1/2}) dx$

b. $\int \frac{x^3 - x^2 + 4}{x^3} dx$

c. $\int \frac{3 dx}{4(x^2 + 1)}$

d. $\int x\sqrt{2 - x^2} dx$

e. $\int \frac{\ln(x - 2)}{x - 2} dx$