Physics 9 Spring 1996

Homework Assignment 2.

I. Look up the Expand[], ExpandAll[], Factor[] and Simplify[] commands, and the Trig option. Then

a) Evaluate $e^{in\pi/2}$ for $n = 0 \ldots 4$

b) Expand and recover $\frac{(x-a)(x-b)(x-c)}{(x-d)(x-e)(x-f)}$

c) Express $(\sin^4(x) - \cos^4(x))^2$ in terms of $\cos(2x)$ or $\cos(4x)$

II. Look up the D[] and Integrate[] commands. Then compute and simplify:

a) $\frac{d}{dx}\left[f^2(x)\sqrt{g(x)}\sin(x)/x^3\right]$

b) $\int dx\, e^{-x} x^2 \cos(x)$

c) $\int dx\, \sin^5(x)$

d) $\int_0^1 dx\, x^2(1-x)^3$

e) $\int_0^\infty dx\, x^{n-1} e^{-ax}$ and evaluate for $a = 1$, $n = 5$

In b) and c) verify the correctness of the answer by differentiation.

III. Look up the Solve[] and FindRoot[] commands. Then find the roots of

a) $x^4 - x + 1 = 0$; compute the sum and product of the roots.

b) $\cos^2(x) = 3\tan(\sin(x))\log(1+x)$ in $(0, 1)$.