1. Differentiate the following: (Do **NOT** simplify!)

a. $f_1(x) = x^3 + 8\,e^{-2x}$,

b. $f_2(x) = 4\,\sin(2x+1)$,

c. $f_3(x) = \dfrac{1}{4x^2} + 7$,

d. $f_4(x) = 2\,\ln(x^2+5)$,

e. $f_5(x) = x^2\cos(3x)$,

f. $f_6(x) = 4e^{x^3+1}$,

g. $f_7(x) = 2x\,e^{x/2}$,

h. $f_8(x) = \sqrt{x^4+6}$,

i. $f_9(x) = 3\,\cos(2e^x - 1)$,

j. $f_{10}(x) = 3\sqrt{x} + \ln(4x)$,

2. For each of the following functions, give the domain. Find all x and y-intercepts and any asymptotes, if they exist. Find the derivative of the functions, then determine any maxima or minima. Give both the x and y values. Sketch the graph of the function.

a. $y = 2 + 7\left(e^{-0.01x} - e^{-0.5x}\right)$,

b. $y = 3(x-2)e^{-(x-2)/2}$.