

## Computer Assignment

Answer the questions below, using a computer algebra system such as Wolfram Alpha or Maple. Copy all relevant answers into this Word document and return it to me via email attachment on or before the day of the final exam. This will count as extra credit towards your final grade.

1. Find the following derivatives (simplified):

a)  $f(x) = \sin(\ln(x^2 - 2x)) + 5e^{x^2-2x} - \arccos(\sin(x^2-1))$

b)  $g(x) = \frac{\sin^2(x)\sqrt[3]{x+1}}{(x^2-1)^4 \cos^3(x)}$

c) For which of these functions would *logarithmic differentiation* be appropriate (you do not actually *need* to do it if you don't want to)?

2. Find the following integrals:

a)  $\int x^2 e^x dt$

b)  $\int x e^{x^2} dt$

c)  $\int \frac{4t+3}{(6t^2+9t+1)} dt$

d)  $\int_0^1 \frac{y^2}{(4-3y)^4} dy$

e) Which of these integrals could you solve by hand using substitution (you do not actually have to do it)?

3. Find all critical points for the function  $f(x) = e^{x^3-4x+1}$  and classify them as local min or local max. **Extra credit:** come up with a theorem regarding the critical points of a function  $h(x) = e^{f(x)}$

4. Plants that died or were cut down no longer replenish their carbon, including the radioactive isotope carbon-14, which has a half-life of 5,568 years. A wooden handle of a fossil hand tool is found that contains only 40% of the normal amount of carbon-14. How old is that handle? (This is the principle idea in *carbon-dating*). Note that if the half life is 5,568 years, then 50% of the initial material will be gone in 5568 years. You want to know when 40% is remaining, so the correct answer must be somewhat greater than 5568 years.