

CAP 2017, HW 2 due January 31

Give complete explanations of what you are doing, written in full sentences. Solutions that have all the correct calculations and computations, but lack explanations, will not get full marks!

1. Calculate the derivative of $f(x) = \sqrt{3x+1}$, using only the definition of the derivative, not any of the rules of differentiation.
2. Calculate the following derivatives, showing your working. Here you can use differentiation rules and known formulas, but must state clearly when you do so - you will obtain no marks if you only give the solution.
 - $\frac{x^2 - 2\sqrt{x}}{x}$
 - $x^2 \sin(x) \tan(x)$
 - $\sqrt[3]{1 + \tan(t)}$
 - $x \sin\left(\frac{1}{x}\right)$
 - $\left(\frac{v}{v^3+1}\right)^6$
3. Find the equations of the tangent lines to the curves
 - $y = x + \tan(x)$ at the point (π, π)
 - $y = \frac{\sqrt{x}}{x+1}$ at the point $(4, 0.4)$
4. Use linear approximations to estimate the numbers $\sqrt{99.8}$ and $\frac{1}{1002}$.