Disclaimer: this exercises help you better prep your final exam. They are designed only to make life easier, and to push some students to do a real prep by themselves. Recall that we posted another review. It is appropriate to check that file too. Good Luck!

Important identities: $x^2 - y^2 = (x-y)(x+y)$; $(x+y)^2 = x^2 + 2xy + y^2$; $(x-y)^2 = x^2 - 2xy + y^2$; $x^3 - y^3 = (x-y)(x^2 + xy + y^2)$.

1. Solve $\ln(2009x + 2010) = -2011$.

Solution: Composing with the exponential function one gets that $2009x + 2010 = e^{-2011}$, thus we isolate x as follows:

$2009x = e^{-2011} - 2010$, hence $x = \frac{e^{-2011} - 2010}{2009}$. Hard?

2. Solve $e^{87x-56} = 4$.

Solution: Using the fact the ln is the inverse function of the exponential one gets that $87x - 56 = \ln(4)$. Isolate x as follows:

$87x = 56 + \ln(4)$, hence $x = \frac{56+\ln(4)}{87}$. Is it harder than exercise 1? Why?

3. Are the following vectors perpendicular? Explain.

$\overrightarrow{u} = [3, 1, 45] \quad \overrightarrow{v} = [-15, 0, 1]$

Solution: Note that $\overrightarrow{u} \cdot \overrightarrow{v} = 3 \times (-15) + 1 \times 0 + 45 \times 1 = 0$. Thus they are perpendicular. (Recall that 2 vectors are perpendicular if and only if their dot product is 0.)

4. Find the derivative of $\frac{\cos(2x)}{e^{2x}} + e^{\sin(x)} + 2^x$.

5. Find the equation of the tangent line to the graph of $f(x) = \frac{\sin(2x)}{e^{2x}} + e^{\sin(x)} + 2^x$ at the point $(0, 2)$.

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