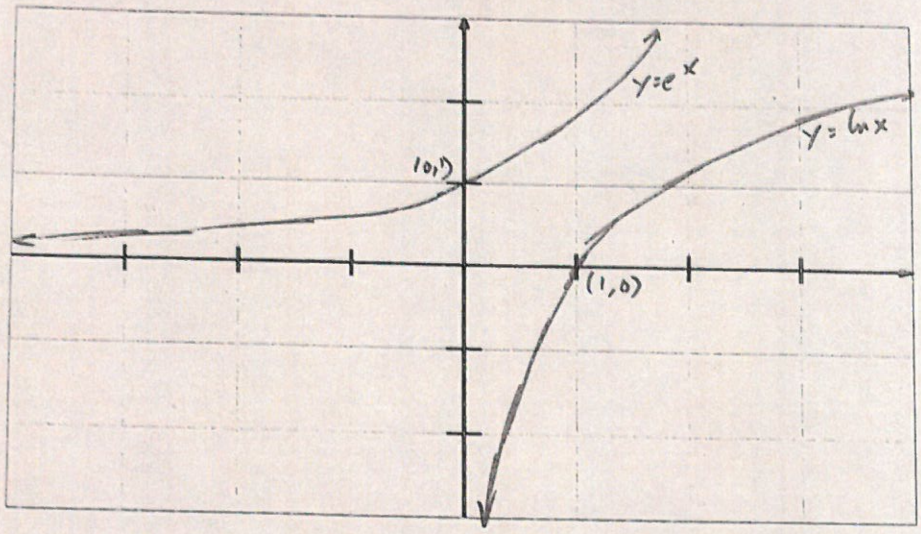
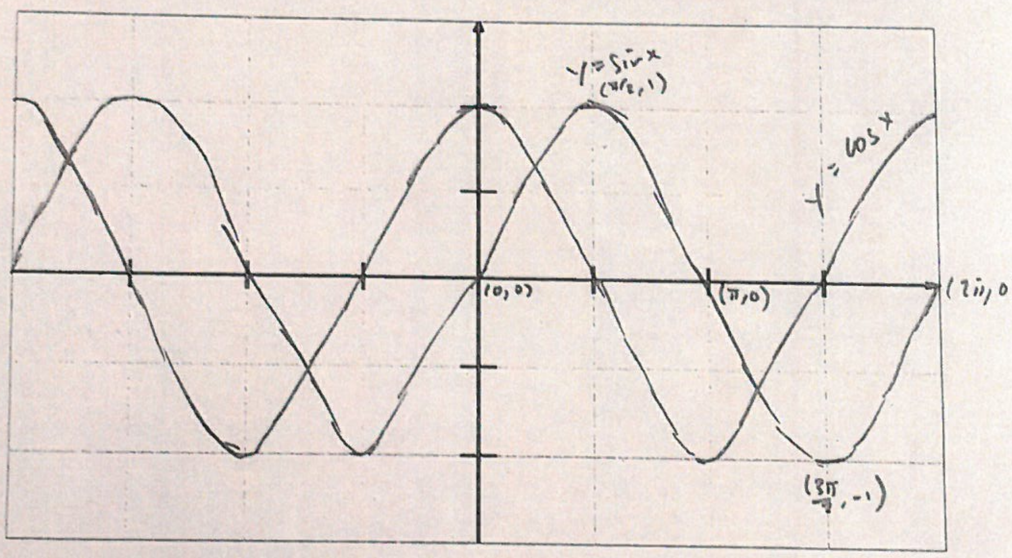
Math 1210: Worksheet #1 — Winter 2017

Name: Micah (solutions)	A#:	Section: EF

[4] 1. In the coordinate system below sketch the graphs of functions $y = e^x$ and $y = \ln(x)$. Make sure that you clearly label the coordinate system and each curve.



[4] 2. In the coordinate system below sketch the graphs of the functions $y = \sin(x)$, $y = \cos(x)$. Make sure that you clearly label the coordinate system and each curve.



[4] 3. Find the equation of the secant line of the curve $y = e^x$ above the interval $[\ln(2), \ln(6)]$. Write the equation in the "slope, y-intercept form" and simplify as much as possible.

The curve passes through $(\ln 2, e^{\ln 2} = 2)$ and $(\ln 6, e^{\ln 6} = 6)$

Hence has slope $\frac{6-2}{\ln 6 - \ln 2} = \frac{4}{\ln 3}$ so $y = \frac{4}{\ln 3}x + b$

Thus $6 = \frac{4}{\ln 3}\ln 6 + b$ so $b = 6 - 4\left(\frac{\ln 6}{\ln 3}\right)$ Hence the secant line:

$$\boxed{y = \frac{4}{\ln 3}x + 6 - 4\left(\frac{\ln 6}{\ln 3}\right)}$$

9

[2] 4. If $f(x) = \ln(x^2 + x + 1)$, $g(x) = 2e^x$ and $h(x) = x + 1$, then

$(f \circ g \circ h)(x) = \ln\left(\left(2e^{x+1}\right)^2 + 2e^{x+1} + 1\right)$

[6] 5. Perform the required task and **simplify**.

(a) Write as a sum of summands of the form x^a. $\frac{x^2 + \sqrt[5]{x}}{x^3} = \frac{x^2}{x^3} + \frac{x^{1/5}}{x^3} = x^{-1} + x^{1/5 - 15/5}$

$= x^{-1} + x^{-14/5}$

(b) Put on common denominator. $\frac{1}{x-3} - \frac{3}{x} = \frac{x}{x(x-3)} - \frac{3(x-3)}{x(x-3)}$

$= \frac{x - 3x + 9}{x(x-3)} = \frac{-2x + 9}{x(x-3)}$

(c) Expand. $(x^2 + x + 1)(x^2 - 2x + 3) = x^4 - 2x^3 + 3x^2 + x^3 - 2x^2 + 3x + x^2 - 2x + 3$

$= x^4 - x^3 + 2x^2 + x + 3$

(d) Rationalize and cancel if possible. $\frac{x+2}{\sqrt{x^2+x+7} - 3} = \left(\frac{x+2}{\sqrt{x^2+x+7} - 3}\right)\left(\frac{\sqrt{x^2+x+7}+3}{\sqrt{x^2+x+7}+3}\right)$

$= \frac{(x+2)\left(\sqrt{x^2+x+7}+3\right)}{x^2+x+7-9} = \frac{(x+2)\left(\sqrt{x^2+x+7}+3\right)}{x^2+x-2} = \frac{(x+2)\left(\sqrt{x^2+x+7}+3\right)}{(x+2)(x-1)}$

$$\boxed{= \frac{\sqrt{x^2+x+7}+3}{x-1}}$$

(e) $\frac{(e^x)^{x+1}e^{x-1}}{e^{2-3x}} = \frac{e^{x^2+x}e^{x-1}}{e^{2-3x}}$

$= \frac{e^{x^2+2x-1}}{e^{2-3x}} = e^{x^2+2x-1-2+3x}$

$= e^{x^2+5x-3}$

(f) $\ln(3e^x/5) + \ln(5e^x) - \ln(3e^{x^3}) =$

$\ln\left(\frac{\frac{3e^x}{5} \cdot 5e^x}{3e^{x^3}}\right) = \ln\left(\frac{e^{2x}}{e^{x^3}}\right) = \ln e^{2x-x^3} = 2x - x^3$