Class Test

Time allowed: 40 mins

1. Solve for x, finding **all** solutions:

$$\ln(x^2 + x) - \ln x = 1.$$

2. Use the addition formula $\cos(a+b) = \cos(a)\cos(b) - \sin(a)\sin(b)$ (or another method if you prefer) to find **all** solutions t of the equation

$$\cos t + 30 \sin t = 15.$$

3. Differentiate the function f given by

$$f(x) = \frac{e^x}{x \ln x}.$$

4. Compute the slope $\frac{dy}{dx}$ at the point $(1, 1)$ for the curve given *implicitly* by

$$y^2 - x^2 e^y = 1 - ex.$$

5. Find the local minima and maxima of the function given by

$$f(x) = e^x \cos x.$$

Say whether they are local maxima or local minima.

6. Evaluate the indefinite integral

$$\int \frac{\sin x + 1}{\cos x - x}\, dx.$$

7. Evaluate the definite integral

$$\int_1^5 x \log_5 x \, dx.$$

8. Find the third order Taylor polynomial at $x = e$ of the function f given by

$$f(x) = x \cosh x.$$

RM, 06/11/2017