Hand in the solution to this test on the stated date (5% of your final grade). *Read carefully. Look it up. Answer questions in order from left to right, top to bottom.* You must work alone. You probably want to consult a math handbook.

Neatly draw the graph of the following functions, showing the locations of 0 and ± 1 on each axis. Give the derivative. Indicate non-principal values as a broken line. Make sure that you give enough of the curves to *clearly* demonstrate *all* features. *Make sure that you have answered all parts, including derivatives.*

$$2x - 2 \qquad\qquad x^2 + 1 \qquad\qquad x^4 - x^2$$

$$\sin(x) \qquad\qquad \arcsin(x) \qquad\qquad \sinh(x)$$

$$\cos(x) \qquad\qquad \arccos(x) \qquad\qquad \cosh(x)$$

$$\tan(x) \qquad\qquad \arctan(x) \qquad\qquad \tanh(x)$$

$$\ln(x) \qquad\qquad e^x \qquad\qquad \tan(x^2)$$

Find (include any integration constants and absolute signs):

$$\int x^{-2}\mathrm{d}x = \qquad\qquad \int_1^2 x^{-2}\mathrm{d}x = \qquad\qquad \int_1^x \xi^{-2}\mathrm{d}\xi =$$

$$\int \frac{\mathrm{d}x}{x} = \qquad\qquad \int \frac{1}{1-x^2}\mathrm{d}x = \qquad\qquad \int \frac{1}{1+x^2}\mathrm{d}x =$$

$$\int \ln(x)\mathrm{d}x = \qquad\qquad \int xe^x\mathrm{d}x = \qquad\qquad \int xe^{x^2}\mathrm{d}x =$$

$$\begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix} = \qquad\qquad \lim_{x\to 0}\frac{\tan(x)}{x} = \qquad\qquad \frac{\mathrm{d}}{\mathrm{d}x}\int_x^2 xf(\xi)\mathrm{d}\xi =$$

$$2 + 1 + 0 - 1 - 2 - 3 - 4 \ldots - 99 - 100 = \qquad\qquad e^2 + e^1 + e^0 + e^{-1} + e^{-2} + e^{-3} + e^{-4} + \ldots =$$

$$\text{Solve}: \quad \frac{\mathrm{d}y}{\mathrm{d}x} = y \qquad y(1) = 1$$