Hand in the solution to this test on the date stated above (5% of your final grade). *Read carefully. And 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.*

1) $2x - 2$ 2) $x^2 + 1$ 3) $x^4 - x^2$

4) $\sin(x)$ 5) $\arcsin(x)$ 6) $\sinh(x)$

7) $\cos(x)$ 8) $\arccos(x)$ 9) $\cosh(x)$

10) $\tan(x)$ 11) $\arctan(x)$ 12) $\tanh(x)$

13) $\ln(x)$ 14) e^x 15) $\tan(x^2)$

Find (include any integration constants and absolute signs):

16) $\displaystyle\int x^{-2}\mathrm{d}x =$ 17) $\displaystyle\int_1^2 x^{-2}\mathrm{d}x =$ 18) $\displaystyle\int_1^x \xi^{-2}\mathrm{d}\xi =$

19) $\displaystyle\int \frac{\mathrm{d}x}{x} =$ 20) $\displaystyle\int \frac{1}{1-x^2}\mathrm{d}x =$ 21) $\displaystyle\int \frac{1}{1+x^2}\mathrm{d}x =$

22) $\displaystyle\int \ln(x)\mathrm{d}x =$ 23) $\displaystyle\int xe^x\mathrm{d}x =$ 24) $\displaystyle\int xe^{x^2}\mathrm{d}x =$

25) $\begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix} =$ 26) $\displaystyle\lim_{x\to 0} \frac{\tan(x)}{x} =$ 27) $\displaystyle\frac{\mathrm{d}}{\mathrm{d}x}\int_x^2 xf(\xi)\mathrm{d}\xi =$

28) $2+1+0-1-2-3-4\ldots-99-100 =$ 29) $e^2+e^1+e^0+e^{-1}+e^{-2}+e^{-3}+e^{-4}+\ldots =$

30) Solve : $\displaystyle\frac{\mathrm{d}y}{\mathrm{d}x} = y$ $y(1) = 1$