

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 (like periodicity, asymptotic behavior, multiple valuedness, etcetera). *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 fully simplified (include integration constants and absolute signs):

16) $\int x^{-2} dx =$

17) $\int_1^2 x^{-2} dx =$

18) $\int_1^x \xi^{-2} d\xi =$

19) $\int \frac{dx}{x} =$

20) $\int \frac{1}{1-x^2} dx =$

21) $\int \frac{1}{1+x^2} dx =$

22) $\int \ln(x) dx =$

23) $\int xe^x dx =$

24) $\int xe^{x^2} dx =$

25) $\begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix} =$

26) $\lim_{x \rightarrow 0} \frac{\tan(x)}{x} =$

27) $\frac{d}{dx} \int_x^2 xf(\xi) d\xi =$

28) $2+1+0-1-2-3-4\dots-99-100 =$

29) $e^2+e^1+e^0+e^{-1}+e^{-2}+e^{-3}+e^{-4}+\dots =$

30) Solve: $\frac{dy}{dx} = y$ $y(1) = 1$