

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  $\pm 1$  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)  $x - 2$

2)  $x^2 - 4$

3)  $x^3 - x$

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)  $\sin(\pi x^2)$

Find (include any 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)  $\int x e^x dx =$

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

25)  $\begin{vmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 1 \end{vmatrix} =$

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

27)  $\frac{d}{dx} \int_0^x \frac{\sin(x\xi)}{\xi} d\xi =$

28)  $1 + 2 + 3 + 4 + \dots + 1000 =$

29)  $x + x^2 + x^3 + x^4 + \dots =$

30) Solve:  $\frac{dy}{dx} = -y$   $y(0) = 1$