

In 1-5 find the derivative.

1.)  $y = \frac{1}{2}x^{100} + \frac{x^{27}}{27} + 3x^3 + \pi + x^{-2}$  2.)  $y = (x^2+1)^8(x^2-1)^{10}$

3.)  $y = e^x + e^{x^2} + \ln x + \ln x^2 + 7e$  4.)  $y = xe^{-x} - \frac{2}{x+1}$

5.)  $y = (u^{100} + u^2 + u^{-1})^{202}$

In 6, 7 find the limits:

6.)  $\lim_{x \rightarrow 2} x^3 + 2x + 7$  7.)  $\lim_{x \rightarrow -1} \frac{x^3 + 6x^2 + 11x + 6}{x^2 - 1} \frac{x+1}{x^2+1}$

8.) If  $A = \begin{bmatrix} 1 & 0 \\ -1 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 9 \\ -2 & 3 \end{bmatrix}$ , find  $B - 2A$ .

9.) Solve for  $x$ :  $\log 3 + \log x^2 = \log(x+z)$

10.) Find the equation of ~~that~~ the tangent line to  $f(x) = x^2 + 1$  at  $x = 2$ .

11.) Solve:  $x + y + z = 2$  12.)  $\begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 1 \\ 3 & 2 & 1 \end{bmatrix} = ?$   
 $x - y + 2z = 4$   $\det \begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 1 \\ 3 & 2 & 1 \end{bmatrix} = ?$   
 $x + 2z = 5$

13.) Find  $\begin{bmatrix} 3 & 2 \\ 1 & -1 \\ 3 & 3 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} = ?$

14.)  $\int 4 + 3x^2 + x^{-5} + x^{5/2} dx = ?$  15.)  $\int e^{2x} + x^{-1} dx = ?$

16.) Use the differential to approximate  $\frac{1}{\sqrt{.99}}$ .

17.)  $\int 2x(x^2+7)^{50} dx = ?$

18.) If  $Q(x) = x^2 + 3$  is a cost function, find the value of  $x$  that minimizes the average cost  $q(x)$ .

19.) For  $f(x) = x^3 - 3x + 3$ , find all relative minimums and relative maximums and points of inflection.

20.) A happy (its over) student wishes to throw a party to use up his/her supply of 4 qts of gin, 5 qts of vodka and 13 qts of punch. S/he has 3 formulas for Mixed punch: #1 (Mild) requires 3 qts of punch and 1 qt of vodka; #2 (Stronger) requires 2 qts of punch and 1 qt of gin; and #3 (Missionaries downfall) requires 1 qt of punch, 3 qts of gin and 3 qts of vodka. How many of each formula is need to use up his/her supply?