1. Find f'(1), if $f(x) = \sqrt{2x^2+2} - \frac{2x}{x+1} + 2x\arctan(x) - 4e^{2x^2+1}$.
2. Find the slope of the equation of the normal to the curve $xy^2 = e^{x^2}$ at the point $(1, \sqrt{e})$.
3. A particle moves along the x-axis so that at any time its position is given by $x(t) = (1/2)\sin(t) + \cos(2t)$.

Let A be the instantaneous velocity at $t = \pi/4$.
Let B be the accleration of the particle at $t = \pi/2$.
Let $C = x(\pi/4)$. Find A + B + C.

4. Find the eleventh derivative of $\sin(2x) + \cos(2x)$.
5. Let $A = f'(1)$ where $f(x) = 3^{x^2-1}$.
   Let $B = f^{-1}(1)$ where $f(x) = \ln(x-1)$.
   Let $C = f'(1)$ where $f(x) = \arcsin(x^2-1)$.
   Let $D = f''(1)$ where $f(x) = (x^2-1)^2$. Find (BC/AD).
6. Write the equation of the normal to the curve $y = 3e^x + x^2 - 2x - 1$ passing through the focus of $x^2 = 8y$ in standard form.(Ax+By+C=0).
7. In what interval(s) is the first derivative of f decreasing and concave up? $f(x) = xe^x$
8. If $0 < k < \pi$, and $\int_0^k \cos(2x)dx = \frac{1}{2}$, and if $y = 3\sin(\frac{r\pi x}{2})+2$ has a period of 3, find k/r .
9. Find the slope of the tangent to $y = \sec\left(\frac{2\pi x}{3}\right) + e^{\ln(4x^2)}$ at $x = b$, where $b = \lim_{n\to 0}\left(\frac{\sin(3n)-3e^n+3}{n^2}\right)$.
10. An isosceles triangle is drawn with its vertex at the origin, its base parallel to and above the x-axis and the vertices of its base on the curve $y = 36 - x^2$. Determine the area of the largest such triangle.
11. $y = (\sin(x))^x$. Write the equation of the tangent at $x = \frac{\pi}{2}$.
12. $3f'(x) = e^x y$. If x = 0 when y = 1, find x when y = e.
13. $f(x) = 2x^3 - 9x^2 - 24x + 2$. Find the absolute maximum value of f on $[-4,2]$.
14. One side of a house has the shape of a square surmounted by an equilateral triangle. If the length of the base is measured as 48 feet, with a maximum error in measurement of 1 inch, use differentials to approximate the maximum error in the calculation of the area of one side of the house.
15. Find the $\lim_{x\to 0}\left(\frac{1}{e^x-1} - \frac{1}{x}\right)$.