Names:

1. Find the Taylor polynomial $P_N(x)$ for the given function $f$ at the number $x = a$. Write an equation for the remainder of order $N$, i.e. $R_N(x)$.

(a) $f(x) = x^3 + 3x^2 - 5$, $a = 0$, $n = 3$

(b) $f(x) = e^x \sin x$, $a = 0$, $n = 3$. 
(c) $f(x) = \ln x, \ a = 2, \ n = 5.$

2. Find a general formula for the Taylor series generated by $f$ at $x = a$

(a) $f(x) = x^3 + 3x^2 - 5, \ a = 0$ (compare this to problem 1a).

(b) $f(x) = \cos x, \ a = \pi.$
(c) \( f(x) = \frac{x}{1-x}, a = 0 \) (compare this to the geometric series formula for \( \frac{1}{1-x} \)).

3. (a) Find the general formula for the Taylor series of \( f(x) = \ln x \) for \( a = 1 \).

(b) Evaluate the series at \( x = 2 \) and simplify. Does this series look familiar?

(c) Does the series from part (a) converge? If so, what does it converge to?