Math 122 - #26
Taylor and Maclaurin Polynomials

Find the n-th order Taylor Polynomial for:

1. $f(x) = e^x$ centered at $a = 0$, $n = 4$

2. $f(x) = \sin x$ centered at $a = \pi$, $n = 5$

3. $f(x) = \cos 2x$ centered at $a = 0$, $n = 3$

4. $f(x) = \sqrt{x}$ centered at $a = 1$, $n = 4$

5. $f(x) = \ln x$ centered at $a = 1$, $n = 5$

6. $f(x) = e^{3x}$ centered at $a = 1$, $n = 3$

7. $f(x) = \arctan x$ centered at $a = 0$, $n = 3$

8. $f(x) = \ln(x^2 + 4)$ centered at $a = 0$, $n = 2$

9. $f(x) = \ln(1 - x)$ centered at $a = 0$, $n = 3$

Answers

1. $T_4(x) = 1 + x + \frac{x^2}{2} + \frac{x^3}{3!} + \frac{x^4}{4!}$

2. $T_5(x) = -(x - \pi) + \frac{1}{6}(x - \pi)^3 - \frac{1}{120}(x - \pi)^5$

3. $T_3(x) = 1 - 2x^2$

4. $T_4(x) = 1 + \frac{(x-1)}{2} - \frac{(x-1)^2}{8} + \frac{(x-1)^3}{16} - \frac{5\,(x-1)^4}{128}$

5. $T_5(x) = (x-1) - \frac{1}{2}(x-1)^2 + \frac{1}{3}(x-1)^3 - \frac{1}{4}(x-1)^4 + \frac{1}{5}(x-1)^5$

6. $T_3(x) = e^3 + 3e^3(x-1) + \frac{9e^3}{2}(x-1)^2 + \frac{9e^3}{2}(x-1)^3$

7. $T_3(x) = x - \frac{x^3}{3}$

8. $T_2(x) = \ln 4 + \frac{x^2}{4}$

9. $T_3(x) = -x - \frac{x^2}{2} - \frac{x^3}{3}$