

Worksheet 7

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(1-2) Determine the third Taylor polynomial of the given function at $x = 0$.

1. $f(x) = xe^{3x}$.
2. $f(x) = \sqrt{1-x}$. Approximate $\sqrt{0.16}$. How far are you from the actual value?
3. Determine the fourth Taylor polynomial of $f(x) = \frac{1}{5-x}$ at $x = 4$. What is $f^{(10)}(4)$?
4. Let $f(x) = (x-2)^{10} + (x-2)^5 + 2$. What are $f''(2)$, $f^{(5)}(2)$ and $f^{(9)}(2)$?
5. Let $p_2(x)$ be the second Taylor polynomial of $f(x) = \ln(x)$ at $x = 1$.
 - (a) Use p_2 to estimate $\ln(.8)$.
 - (b) Show that $|f^{(3)}(c)| < 4$ for $c \geq .8$.
 - (c) Show that the error in using $p_2(.8)$ as an approximation for $\ln(.8)$ is at most $\frac{16}{3} \cdot 10^{-3}$.

Determine the sums of the following geometric series when they are convergent.

6. $3 + \frac{6}{5} + \frac{12}{25} + \frac{24}{125} + \frac{48}{625} + \dots$
7. $\frac{3^2}{2^5} + \frac{3^4}{2^8} + \frac{3^6}{2^{11}} + \frac{3^8}{2^{14}} + \frac{3^{10}}{2^{17}} + \dots$
8. $\sum_{j=1}^{\infty} 5^{-2j}$.
9. $\sum_{k=0}^{\infty} \frac{3^{2k+1}}{(-2)^k \cdot 5^{k+1}}$.
10. Show that $.99\bar{9} = 1$.