Chapter 2.8 - Exercises

1. Find the Maclaurin series for $f(x) = e^x$. Find the interval of convergence.

2. Find the Maclaurin series for $f(x) = \sin 2x$. Find the interval of convergence.

3. Write the 4th degree Maclaurin polynomial for $f(x) = \cos 2x$.

4. Given the fact that $\cos(0.2) \approx 0.98006657784124$, estimate $\cos(0.2)$ using the second, fourth, and sixth degree Maclaurin polynomials for $f(x) = \cos x$ to demonstrate that the larger the degree of the approximating polynomial, the more accurate the approximation.

5. Approximate $\ln(2.95)$ using a third degree Maclaurin polynomial, given $\ln(3) \approx 1.09861228867$.

6. Approximate $\ln(2.95)$ using a third degree Taylor polynomial for $f(x) = \ln x$ centered at $c = 3$. Compare the results to the approximation generated by the Maclaurin polynomial of equal degree calculate in problem #5.

7. Find the fourth degree Taylor polynomial for $f(x) = \sin x$ centered at $c = \dfrac{5\pi}{3}$.

8. Estimate $\sin\left(\dfrac{5\pi}{6}\right)$ using the Taylor polynomial in the previous probelm (#7). Compare the approximation to the actual value.

9. Use Taylor polynomials to approximate $\cos 44°$ to at least five digits.

10. Use polynomials of degree $n = 0, 1, 2, 3$ to approximate $\sqrt{18}$. (Make sure to choose the center of the polynomial in the best way.)

11. Find a bound for the magnitude of the remainder term for the Maclaurin polynomials of $f(x) = \cos x$, centered at $c = 0$.

12. Estimate the error in approximating $e^{0.37}$ using the Taylor polynomial of degree $n = 5$ for $f(x) = e^x$ centered at $x = 0$.