

NAME:

Complete each of the following problems. Show all work. You may use your textbook and notes. It is due at the **beginning** of class on Wednesday.

Problem 1

(a) (**2 points**). Compute the third order Taylor polynomial generated by $f(x) = \sin x$ at $x = \pi/6$.

(b) (**1 point**). Use your answer from part (a) to estimate $\sin(31^\circ)$

Hint: You need to express 31° in radians in order to solve the problem.

(c) (**2 points**). Use the Remainder Estimation Theorem to estimate the magnitude of the error in the approximation from part (b).

Problem 2 (1 point). Use the fact that the following series is the value of the Maclaurin series of a function $f(x)$ at some point to find the sum of the series.

$$\sum_{n=0}^{\infty} \frac{(-1)^n 2^n}{n!}$$

Problem 3 (2 points). Find the Maclaurin series for $f(x) = x^2 \cos(x^2)$

Problem 4 (2 points). Let n be a fixed positive integer. Verify that the Maclaurin series generated by $f(x) = x^n$ is just x^n itself by direct calculation.

Hint: When calculating the derivatives $f^{(k)}(0)$, consider the cases $k < n$, $k > n$ and $k = n$ separately.