Homework Assignment 11
April 24, 1998

1 By direct computation, find the 7th degree Taylor polynomial, $P_7(x)$, of the function
   \[ f(x) = -\frac{1}{4}\sin(2x) + \frac{1}{2}x. \]

2 Find the Maclaurin series for
   \[ f(x) = -\frac{1}{4}\sin(2x) + \frac{1}{2}x \]
   by first substituting $2x$ in place of $x$ in the Maclaurin series for $\sin(x)$, by then multiplying that result by $-1/4$, and by then adding $1/2x$ to the resulting series. Compare this with your answer to problem 1.

3 For the function
   \[ f(x) = -\frac{1}{4}\sin(2x) + \frac{1}{2}x, \]
   show that $f'(x) = \sin^2(x)$. \textit{Hint}: Use a certain trigonometric identity which can be found on the inside back cover or Grossman.

4 Use the results of problems 2 and 3 to find the Maclaurin series for
   \[ g(x) = \sin^2(x). \]

5 We know that
   \[ \int e^x \, dx = C + e^x. \]
   Show that term–by–term integration of the Maclaurin series for $f(x) = e^x$ gives the same result.

6 Use the first seven terms of the Maclaurin series for $f(x) = \ln(1 + x)$ and your calculator to obtain a numerical approximation of $\ln(3/2)$. Compare your answer with the answer you get when you just compute $\ln(3/2)$ directly on your calculator.

7 Use your work from problem 2 to find the Maclaurin series for $h(x) = \sin(x) \cos(x)$. 