Group Exam 4

Name: _____

Math 142

Name of group member: _____

Professor Johnson

Name of group member: _____

Problem 1: (a) Find the 4th degree Taylor polynomial for $f(x) = \sqrt{x}$ centered at $a = 9$. You needn't simplify your answer by multiplying out the fractions.

(b) Use the 4th degree Taylor polynomial to approximate $\sqrt{9.3}$ and describe the error. You may assume that the Taylor Series for $f(x)$ centered at $a = 9$ is equal to $\sqrt{x}$ for all x-values in an interval that contains $x = 9.3$.

Signature line: _____ _____

Group Exam 4

Name: _____

Math 142

Name of group member: _____

Professor Johnson

Name of group member: _____

Problem 2: (a) Find the power series representation of $g(x) = \ln(1 + x)$ centered at $a = 0$. Show all work.

(b) Determine the interval of convergence of the power series representation of $g(x)$ found above.

(c) Find the sum of the series. Hint: Use parts (a) and (b).

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}(0.8)^n}{n} =$$

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n} =$$

Signature line: _____ _____

Group Exam 4

Name: _____

Math 142

Name of group member: _____

Professor Johnson

Name of group member: _____

Problem 3: (a) Find the Maclaurin series for $g(x) = x^2 e^{(x^{10})}$. By following the steps below.

(i) First find the Maclaurin series for e^x and determine its interval of convergence.

(ii) Plug x^{10} into the series representation for e^x found above to find a power series representation for $e^{x^{10}}$.

(iii) Multiply and distribute x^2 times the series representation for $e^{x^{10}}$ found above.

(b) Use the Maclaurin series for $g(x) = x^2 e^{(x^{10})}$ to evaluate the integral $\int_{-0.3}^{0} x^2 e^{(x^{10})}\, dx$. Your answer will be a series.

(c) Give an example of another integral that cannot be evaluated using any of the previously studied techniques, but CAN be evaluated using the power series technique above.

Signature line: _____ _____