**MATH 162 Practice TEST III**

**1.**For each series below, determine absolute convergence, conditional convergence or divergence. Justify each answer.











**2.** For each power series below, determine the *radius of convergence* and the *interval of convergence*. Study the behavior of each power series at the *endpoints*.



(b) 

(c) 

**3.**(a) Find the 3rd order Maclaurin polynomial of *cosh x*.

(b) Find the 5th order Taylor polynomial of *cos x* centered at x = /2.

**4**. Find the 4th order Taylor polynomial of ex centered at x = 2.

**5**. Find the 3rd order Maclaurin polynomial of

f(x) = 4 + (x+13)2 + (x+13)3

**6.** By differentiating the power series expansion of y = 1/(1 – x), find the value of



**7**. Find the *first five* non-zero terms of the Maclaurin series expansion of

h(x) = (1 + 2x2) e3x.

**8**. Let f(x) = x8 e5x. Compute f(100)(0). Do not simplify your answer.

***9.*** Find the radius of convergence of the power series:



***10.*** Find the radius of convergence of the power series:



***11.*** Find the radius of convergence of the power series:



**12 .** *Without using* l'Hôpital's rule, calculate the following limit. Show your work!



1. Let G(x) = x3 cosh (3x). Using an appropriate Maclaurin series, compute G(2013)(0). (Do not try to simplify your answer.)
2. Compute:



**15**. (a) Express  as a complex number of the form a + bi.

(b) By expressing -1 as an appropriate complex power of *e*, calculate the five fifth roots of -*i*. Express your answers in the form a + bi.

(c) Using Euler’s formula, express cos(4x) in terms of cos x and sin x.

**16**. Give the correct *form* (for example: A/(x+2) + B/(x –13)) for the partial fraction decomposition of the following rational functions. *Do not solve for A, B, C, …*



**17.** Integrate each of the following functions:





















18. Express each of the following as a trigonometric integral. Do not evaluate.









19. Using division of power series, find the first three non-zero terms of the Maclaurin series expansion of



20. Using multiplication of power series, find the first four non-zero terms of the Maclaurin series expansion of



21. Determine the *interval of convergence* of the following power series. (You need not study end-point behavior.)



22. Using substitution (or any other method that you prefer), evaluate each of the following integrals:















**23.** Solve each of the following initial value problems:

1. dy/dt = (ln t)3/t, y(3) = 13
2. dy/dx = sec2 x + tan2 3x + 14, y(0) = 88
3. ds/dt = t cos t + 1 + sin t, y (/2) = 2013

24. Analyze the behavior of the series



*As far as the laws of mathematics refer to reality, they are not certain; as far as they are certain, they do not refer to reality.*

* Albert Einstein