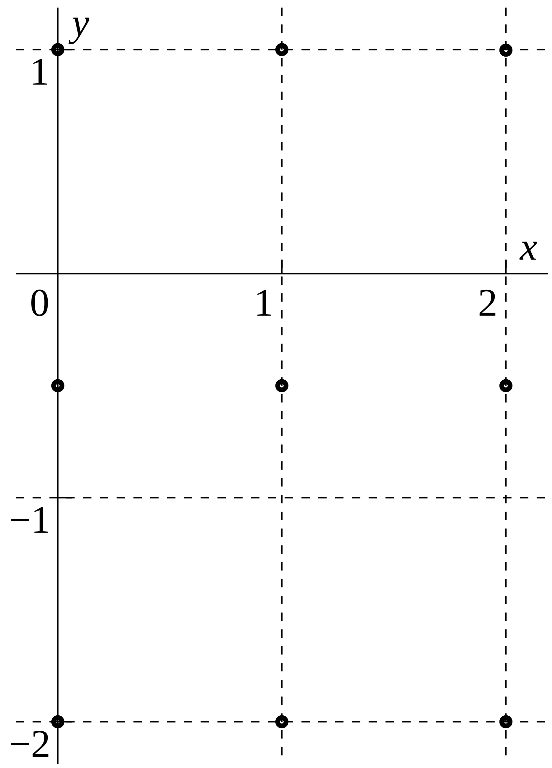
(16) 1. a) Sketch the elements of the slope field or direction field for the differential equation $\frac{dy}{dx} = x(1+y)$ at the nine points indicated, which are when $x = 0$ and $x = 1$ and $x = 2$ and when $y = -2$ and $y = -\frac{1}{2}$ and $y = 1$.

b) Find any equilibrium solutions (where y doesn't change) for this differential equation. If there are no such solutions, explain briefly why this is true.

c) Find the solution of the initial value problem $\frac{dy}{dx} = x(1+y)$ and $y(1) = 2$. In the answer express y explicitly as a function of x.



(12) 2. Calculate the arc length over the given interval: $y = \ln(\cos(x))$, $\left[0, \frac{\pi}{3}\right]$.

(12) 3. In this problem $f(x) = x^{3/2}$.

a) Find the second degree Taylor polynomial $T_2(x)$ for $f(x)$ centered at $x = 4$.

b) What is $T_2(5)$?

c) Use the Error Bound for Taylor polynomials to estimate the difference between $T_2(5)$ and $5^{3/2}$.

(10) 4. Find the 6^{th} degree Taylor polynomial for $f(x) = (1+3x)e^{(-x^2)}$ centered at $x = 0$. (This is also called the Maclaurin polynomial.) Your answer should be a polynomial of degree 6.

Hint You may begin with an appropriate Taylor polynomial for e^x and modify it to get the polynomial needed here.

(12) 5. a) Does the sequence $\left\{n\left(5^{2/n} - 1\right)\right\}$ converge? If it does, find its limit.

b) Does the series $\sum_{n=1}^{\infty} \frac{4^n + (-3)^n}{5^n}$ converge? If it does, find its sum.

(12) 6. The series $\sum_{n=1}^{\infty} \frac{5}{6n+3^n}$ converges and its sum, to an accuracy of .001, is .981. Find a positive integer N so that the partial sum, $S_N = \sum_{n=1}^{N} \frac{5}{6n+3^n}$, has a value within .001 of the sum of the whole series. Explain your reasoning.

n	3^n
1	3
2	9
3	27
4	81
5	243
6	729
7	2,187
8	6,561
9	19,683
10	59,049

Comment You are *not* asked to find the "best possible" N, only to find a convenient N which satisfies the requirement and to support your assertion.

(12) 7. The infinite series $\sum_{n=1}^{\infty} \frac{5}{\sqrt{n}}$ diverges. Find N so that the partial sum, $\sum_{n=1}^{N} \frac{5}{\sqrt{n}}$, is larger than 100.

Comment You are *not* asked to find the "best possible" N, only to find a convenient N which satisfies the requirement and to support your assertion.

(14) 8. This problem is about the power series

$$\sum_{n=1}^{\infty} \left(\frac{2^n}{\sqrt{n}}\right) x^n.$$

a) What is the radius of convergence of this power series?

b) What is the behavior of the power series (divergence, absolute or conditional convergence) on the boundary points of the interval of convergence?

A **A**

Second Exam for Math 152

Sections 1, 2, and 3

April 17, 2008

NAME ____

SECTION __________

Do all problems, in any order.
Show your work. An answer alone may not receive full credit.

No texts, notes, or calculators other than the attached formula sheet may be used on this exam.

Problem Number	Possible Points	Points Earned:
1	16	
2	12	
3	12	
4	10	
5	12	
6	12	
7	12	
8	14	
Total Points Earned:		

Find exact values of standard functions such as e^0 and $\sin(\frac{\pi}{2})$.
Otherwise do NOT "simplify" your numerical answers!

A **A**