Midterm 1 practice 2

UCLA: Math 31B, Spring 2017

Instructor: Noah White
Date:
Version: practice

- This exam has 4 questions, for a total of 40 points.
- Please print your working and answers neatly.
- Write your solutions in the space provided showing working.
- All final answers should be exact values. Decimal approximations will not be given credit.
- Indicate your final answer clearly.
- Full points will only be awarded for solutions with correct working.
- You may write on the reverse of a page or on the blank pages found at the back of the booklet however these will not be graded unless very clearly indicated.
- Non programmable and non graphing calculators are allowed.

Name: ______________________________

ID number: ______________________________

Discussion section: ______________________________

Question	Points	Score
1	10	
2	10	
3	10	
4	10	
Total:	40	

1. (a) (4 points) Calculate $\frac{d}{dx}\left[e^{e^{(x^2+2)}}\right]$

   (b) (6 points) Calculate $\int \frac{1}{x(\ln x)^2}\ dx$.

2. (a) (3 points) Let $f(x) = 4 + \frac{3}{1}x + \frac{9}{2}x^2 + \frac{5}{6}x^3 + \frac{11}{24}x^4 + \frac{7}{120}x^5$.
What are the Taylor polynomials $T_3(x)$ and $T_7(x)$ for $f(x)$ centered at 0?

(b) (7 points) Let $T_n(x) = (x-1) - \frac{1}{2}(x-1)^2 + \frac{1}{3}(x-1)^3 - \frac{1}{4}(x-1)^4 + \ldots + \frac{(-1)^{n-1}}{n}(x-1)^n$ be the n-th Taylor polynomial for $\ln x$ centered at 1.
Find an n such that
$$\left|\ln\left(\frac{1}{2}\right) - T_n\left(\frac{1}{2}\right)\right| < \frac{1}{10^{10}}.$$

3. For (a)-(c), give the value or say, "undefined."

   (a) (1 point) $\tan(\arctan(2)) =$

   (b) (1 point) $\sin(\arcsin(2)) =$

   (c) (2 points) $\arctan(\tan(\frac{7\pi}{3})) =$

   (d) (6 points) Suppose $a \neq 0$.

   Calculate the following indefinite integral as I did in class (using a u-substitution and the knowledge of fundamental integrals which relate to inverse trigonometric functions).

$$\int \frac{1}{a^2 + x^2}\, dx$$

4. (10 points) Calculate the following indefinite integral

$$\int \frac{6x^3 + 3x^2 + 9x - 8}{(x^2 - 1)(x^2 + 4)}\, dx.$$

[The numbers have been chosen so that they work out well; they are all whole numbers.

In the method of partial fractions, I found looking at the x^3-coefficient useful.

You'll get points for spotting the correct partial fraction decomposition, and displaying knowledge of the relevant integrals. Notice that you did one of these integrals in 3.d).]