

Midterm 1 practice

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. Calculate the following integrals.

(a) (3 points)

$$\int e^{x^2+x} + 2xe^{x^2+x} dx.$$

(b) (3 points)

$$\int_0^1 \frac{x+1}{(x+1)^2+1} dx.$$

(c) (4 points)

$$\int \sec x dx.$$

Hint: this one is quite tricky, multiply by $\frac{\sec x + \tan x}{\sec x + \tan x}$.

2. (a) (1 point) Let $f(x) = x^3 - 3x^2 + 3x - 1$.
What are the Taylor polynomials $T_2(x)$ and $T_4(x)$ for $f(x)$ centered at 0?
- (b) (3 points) Let $f(x) = x^3 - 3x^2 + 3x - 1$.
What are the Taylor polynomials $T_2(x)$ and $T_4(x)$ for $f(x)$ centered at 1?
- (c) (6 points) Let $T_n(x)$ be the n -th Taylor polynomial for

$$f(x) = 2 \cosh x + (x - 3)^{2017}$$

centered at 0.

Find an n such that $|f(1) - T_n(1)| \leq 1$.

3. (a) (6 points) Suppose $a > 0$.

Calculate the following definite integral using a u -substitution and the knowledge of fundamental integrals which relate to inverse trigonometric functions.

$$\int_0^{\frac{a}{2}} \frac{1}{\sqrt{a^2 - x^2}} dx$$

- (b) (3 points) Give a formula for $\sin(\arctan x)$ which does not involve trigonometric functions.
(c) (1 point) Calculate $\lim_{x \rightarrow -\infty} \sin(\arctan x)$.

4. (10 points) Calculate the following indefinite integral

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

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