

Math 16B, Section 3 - Winter 2018
Instructor: Christopher O'Neill
Practice Exam 2, Version 1

Last Name: _____ **First Name:** _____

Directions:

- The use of a calculator, cell phone, laptop or computer is prohibited.
- TURN OFF cell phones and put them away. If a cell phone is seen during the exam, your exam will be collected and you will receive a zero.
- Answer all of the questions, and present your solutions in the space provided. *Show all your work* neatly and concisely and *clearly indicate your final answer*. You will be graded not merely on the final answer, but on the quality and correctness of the work leading up to it.

The UC Davis Code of Academic Conduct

I will conduct myself with honesty, fairness, and integrity.

Signature: _____

(1) This problem concerns the following integral.

$$\int_0^4 e^x dx$$

(a) Estimate the value of the above integral using a left hand sum with $n = 2$ rectangles.

(b) Estimate the value of the above integral using trapezoid rule with $n = 2$ trapezoids.

(c) Use the error estimation formula to bound the error from part (b).

(2) Evaluate each of the following integrals.

(a) $\int (24x^7 + 6x^5 + 5x + 7) dx$

(b) $\int (5 \sin(x) + 6e^x) dx$

(c) $\int 20e^{5x} dx$

(3) Evaluate each of the following integrals.

(a) $\int_{-3}^3 x^2 dx$

(b) $\int_{-5}^{-2} \frac{1}{x} dx$

(4) Solve the following initial value problem.

$$f''(x) = \sin(x) \quad f'(\pi) = 2 \quad f(0) = 5.$$

- (5) Suppose a cannon ball is shot up in the air from atop a 2400ft wall, and that its velocity (in ft/sec) is given by the equation

$$v(t) = -32t + 400.$$

How fast is the cannon ball moving when it hits the ground (i.e. 2400ft below the cannon)?

6

(6) Evaluate the following integral *without* using the fundamental theorem of calculus.

$$\int_0^6 (|x - 2| - 1) dx$$

Trigonometric Identities

$$\begin{aligned}1 &= \sin^2(A) + \cos^2(A) \\ \sec^2(A) &= \tan^2(A) + 1 \\ \csc^2(A) &= 1 + \cot^2(A)\end{aligned}$$

$$\begin{aligned}\sin(A + B) &= \sin(A) \cos(B) + \cos(A) \sin(B) \\ \sin(A - B) &= \sin(A) \cos(B) - \cos(A) \sin(B) \\ \cos(A + B) &= \cos(A) \cos(B) - \sin(A) \sin(B) \\ \cos(A - B) &= \cos(A) \cos(B) + \sin(A) \sin(B)\end{aligned}$$

$$\begin{aligned}\sin(2A) &= 2 \sin(A) \cos(A) \\ \cos(2A) &= \cos^2(A) - \sin^2(A)\end{aligned}$$

Error Estimates

$$|E_T| \leq \frac{M(b-a)^3}{12n^2} \quad f'''(x) \leq M \text{ for all } x \in [a, b]$$