INSTRUCTIONS: Books, notes, and electronic devices are **not** permitted. Write (1) **your full name**, (2) **1350/Exam 3**, (3) **lecture number/instructor name** and (4) **SPRING 2018** on the front of your bluebook. Make a **grading table** for 4 problems and a total. Do all problems. **Start each problem on a new page.** **Box** **your answers.** A correct answer with incorrect or no supporting work may receive no credit, while an incorrect answer with relevant work may receive partial credit. **Justify your answers, show all work.**

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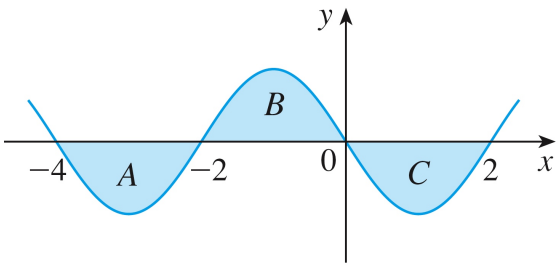
1. The following problems are not related.

   (a)(11pts) Suppose the acceleration of an object at any time t is given by $a(t) = 3t^2 - 4t$ m/s^2, $t \geq 0$. Find the velocity, $v(t)$, at any time t if $v(1) = 1$ m/s. Show all work.

   (b)(11pts) Each of the regions A, B and C bounded by the graph of $f(x)$ and the x-axis has an area of 5, see below. Find the value of $\displaystyle\int_2^0 \left[\pi^2 f(x) - 4\right]\, dx$.



Problem 1: Each of the regions A, B and C pictured above has an area of 5.

   (c)(4pts) Using right endpoints and subintervals of equal width, which of the limits below is equal to $\displaystyle\int_\pi^{2\pi} \sin(x)\, dx$? (**No justification necessary** - *Choose only one answer, copy down the entire answer.*)

   (A) $\displaystyle\lim_{n\to\infty} \sum_{i=1}^{n} \sin\left(\frac{i\pi}{n}\right)$ (B) $\displaystyle\lim_{n\to\infty} \sum_{i=1}^{n} \sin\left(\pi + \frac{i\pi}{n}\right)$ (C) $\displaystyle\lim_{n\to\infty} \sum_{i=1}^{n} \frac{\pi \sin(i\pi/n)}{n}$ (D) $\displaystyle\lim_{n\to\infty} \sum_{i=1}^{n} \frac{\pi \sin(\pi + i\pi/n)}{n}$

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2. The following problems are not related.

   (a)(11pts) Suppose we want to approximate a solution to the equation $3\sin(x) = x$ using Newton's Method. What would the formula for x_{n+1} be? (To get full points for this question you must provide the explicit formula for x_{n+1} in terms of x_n, the generic formula for Newton's Method is not sufficient. You do **not** need to approximate the solution.)

   (b)(11pts) Write the expression $\displaystyle\int_2^5 f(x)\, dx + \int_{-2}^{2} f(t)\, dt - \int_{-2}^{-1} f(x)\, dx$ as a single integral in the form $\displaystyle\int_a^b f(x)\, dx$.

   (c)(4pts) Using differentiation, which one of the choices below can be verified to be equivalent to $\displaystyle\int x\cos(x)\, dx$? (**No justification necessary** - *Choose only one answer, copy down the entire answer.*)

   (A) $\dfrac{x^2}{2}\sin(x) + C$ (B) $\cos(x) + x\sin(x) + C$ (C) $x\sin(x) + C$ (D) $\dfrac{\cos^2(x)}{2} + C$ (E) $\sin(x) + C$

PROBLEMS #3 & #4 ON THE OTHER SIDE

3. The following problems are not related. Show all work.

(a)(12pts) Use the Fundamental Theorem of Calculus to evaluate the definite integral $\int_{-\pi}^{\pi} |3\sin(x)|\,dx$.

(b)(12pts) If $f(x) = \int_4^{x^2} \frac{t-1}{t^2+1}\,dt$, use the Fundamental Theorem of Calculus to find $f'(2)$. Simplify your answer.

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4. The following problems are not related. Show all work.

(a)(12pts) Use u-substitution to evaluate the definite integral $\int_0^4 \frac{\sqrt[3]{1+\sqrt{x}}}{\sqrt{x}}\,dx$. Show all work

(b)(12pts) Find the *average value* of $f(x) = \dfrac{\sin(x)}{\sec(x)}$ on the interval $[0, \pi/4]$. Justify your answer.

THE LIST OF APPM 1350 LECTURE NUMBERS/INSTRUCTOR NAMES FOR THE FRONT OF YOUR BLUE BOOK:

Lecture #	Instructor	Class Time	Lecture #
120	Susan HALLOWELL	MWF 9-9:50	120
130	Sujeet BHAT	MWF 10-10:50	130
150	Sujeet BHAT	MWF 12-12:50	150
170	Susan HALLOWELL	MWF 2-2:50	170
801	Sandra WILLIAMS	MWF 2-2:50	801

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