INSTRUCTIONS: Books, notes, and electronic devices are **not** permitted. Write (1) **your name**, (2) **1350/Test 3**, (3) **lecture number/instructor name** and (4) **FALL 2014** on the front of your bluebook. Also make a **grading table** with room for 4 problems and a total score. **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. **SHOW ALL WORK! SIMPLIFY YOUR ANSWERS AS MUCH AS POSSIBLE!**

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1. The following parts are not related:

   (a)(10 pts) Approximate the area of the region bounded by the curve $y = x^2 + 4$ from $x = -4$ to $x = 4$ and the x-axis using a Riemann Sum with 4 subintervals of equal length and taking the sample points to be midpoints.

   (b) The following limit of Riemann Sums, $\lim_{n\to\infty} \sum_{i=1}^{n} \frac{16i}{n^2}\sqrt{16 - \frac{16i^2}{n^2}}$, describes the area of the region bounded by some function $f(x)$ for $0 \le x \le 4$ and the x-axis using subintervals of equal length and $x_i^* = x_i$.
   (i)(6 pts) What is the function $f(x)$?
   (ii)(9 pts) What is the area of the region described by the limit? (Hint: Interpret the limit as a definite integral.)

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2. The following problems are not related.

   (a)(10 pts) Use Newton's method to find x_2, the second approximation of the intersection point of the functions $y = \sin(x)$ and $y = \cos(x)$, if the initial approximation is $x_1 = \frac{\pi}{2}$.

   (b) A square swimming pool with base width x meters and fixed depth of y meters is being constructed. The inside walls and floor of the pool are to be painted with a special water-proof paint. There is enough paint to cover exactly 300 m^2 of surface and the builder plans to use it all up for the painting of this pool:
   (i)(12 pts) What is the largest possible volume of such a pool?
   (ii)(3 pts) How do you know your answer is a maximum? (Justify your answer based on the theories of this class.)

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3. The following problems are not related:

   (a)(10 pts) Given that $g(x)$ is an odd function, $\int_2^7 g(x)\,dx = 13$ and $\int_5^7 g(x)\,dx = 4$, find $\int_{-2}^5 3g(x)\,dx$.

   (b) Given that $F(x) = \int_{-2}^{2x} \sqrt{5 + t^2}\,dt$, answer the following questions *without attempting to evaluate any integrals:*
   (i)(3 pts) Is $F(-2)$ positive, negative or neither?
   (ii)(6 pts) On what interval(s) is the function $F(x)$ increasing? decreasing?
   (iii)(6 pts) Find the linearization of $F(x)$ at $x = -1$.

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4. The following problems are not related.

   (a)(15 pts) Evaluate these integrals: (i) $\int \sin(x)\cot(x)\,dx$ (ii) $\int_1^{\sqrt{2}} 2x^3\sqrt{x^2 - 1}\,dx$ (iii) $\int_{-2}^{2} \sqrt{16 - 4x^2}\,dx$

   (b)(10 pts) Show that $\int_0^1 x^{10}(1 - x)^6\,dx = \int_0^1 x^6(1 - x)^{10}\,dx$. Justify your answer.

LECTURE NUMBERS LISTED ON THE OTHER SIDE

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

Lecture #	Instructor	Class Time	Location
110	Ryan CROKE	MWF 8-8:50	BESC 180
120	Ryan CROKE	MWF 9-9:50	ECCR 200
130	Murray COX	MWF 10-10:50	ECCR 245
150	Sujeet BHAT	MWF 12-12:50	ECCR 200
160	James CURRY	MWF 1-1:50	ECCR 1B40
170	Sujeet BHAT	MWF 2-2:50	ECCR 265
180	Jonathan KISH	MWF 3-3:50	EKLC 1B20
594R	Jonathan KISH	MWF 1-1:50	ANDS N103

— **END** —