

INSTRUCTIONS: Books, notes, and electronic devices are not permitted. Write (1) **your name**, (2) **1360/EXAM 2**, (3) **instructor's name/class time** and (4) **SPRING 2011** on the front of your bluebook. Also make a scoring table with room for 6 problems and a total score. **Work 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.

— SHOW ALL WORK —

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1. (a) (3 pts) Graph the region bounded by $y = x - 2$ and $x = y^2$.
 (b) (12 pts) Find the volume of the solid created by revolving the region bounded by $y = x - 2$ and $x = y^2$ about the line $y = 3$.
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2. (a) (2 pts) Graph the region bounded by the curve $x^3 = 4/y$, and the lines $x = 1$ and $y = 1/2$.
 (b) (8 pts) Set up, but **do not solve**, an integral (or integrals) to find the volume of the solid generated by revolving the region bounded by the curve $x^3 = 4/y$, and the lines $x = 1$ and $y = 1/2$ about the line $x = -e$, using the *disk/washer method*
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3. (10 pts) Solve the following differential equations: (a) $2\sqrt{xy}\frac{dy}{dx} = 1$ (b) $\frac{dx}{dt} = e^{t-x}$
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4. (20 pts) Consider a thin metal plate with density $\rho(x) = 2$ covering the region bounded by the curve $y = \arctan(x)$, $0 \leq x \leq 1$ and the x -axis.
 (a) Find the mass of the thin metal plate.
 (b) Set-up, **but do not solve**, an integral to find the moment about the x -axis, M_x , of the thin metal plate.
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5. (10 pts) Find the length of the curve $y = \cosh(x)$ from $x = 0$ to $x = \ln(2)$.
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6. (35 pts) Determine if the following converge or diverge. Provide proof of your answers - you must name any test that you use. If any of the series converge, find the sum if possible. (5 pts each)
- (a) $\sum_{n=1}^{\infty} \frac{9}{(3n-1)(3n+2)}$ (b) $\left\{ \frac{n + \ln(n)}{n} \right\}_{n=1}^{\infty}$ (c) $\left\{ \frac{n \sin(n)}{3 + n^2} \right\}$ (d) $\sum_{m=2}^{\infty} \frac{e^{2m}}{\pi^m}$
- (e) $\{f_m\}_{m=106}^{\infty}$ where $f_m = 1 + (.90)^m$ (f) $\sum_{b=3}^{\infty} \ln(3b) - \ln(2b)$ (g) $\sum_{n=2}^{\infty} \frac{5(-1)^n}{3^{2n}}$
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FORMULAS ON THE OTHER SIDE.