MA 126 — Fall 2016 — Prof. Clontz — Midterm Retake

Name: _____

- Submit your final answers on the provided answer sheet.
- You may use at most three pages (front and back) of 8.5×11 inch paper of notes in your own handwriting.
- No personal electronics are allowed. You may borrow a calculator from the instructor, but none of the questions require the use of a calculator.
- This exam is due after 55 minutes. Answer sheets submitted over two minutes late will not be graded.
- Your score for this retake is worth 10%=30pts for each correct response, making 70%=210pts the maximum grade. If this grade is higher than your Midterm exam grade, this grade will replace it.

1. Find $\int 6x^2 \sinh(x^3)\,dx$.

   A. $2x\sin(x^3) + C$

   B. $2\cosh(x^3) + C$

   C. $3x^3 \sinh(x^4) + C$

   D. $3\cosh(3x^2) + 4x\sinh(3x^2) + C$

2. Use integration by parts with cycling to find $\int e^{2\theta}\cos\theta\,d\theta$.

   A. $\frac{3}{5}e^{2\theta}\cos\theta - \frac{4}{5}e^{2\theta}\sin\theta + C$

   B. $\frac{1}{5}e^{2\theta}\sin\theta + \frac{2}{5}e^{2\theta}\cos\theta + C$

   C. $\frac{2}{9}e^{2\theta}\cos\theta + \frac{4}{9}e^{2\theta}\sin\theta + C$

   D. $\frac{5}{9}e^{2\theta}\sin\theta - \frac{1}{9}e^{2\theta}\cos\theta + C$

3. Find $\int \frac{2}{4+z^2}\,dz$.

   A. $\tan^{\leftarrow}(z/2) + C$

   B. $2\sec^{\leftarrow}(z/2) + C$

   C. $3\sin^{\leftarrow}(z/2) + C$

   D. $4\cos^{\leftarrow}(z/2) + C$

4. Find $\int \frac{6y^2+2}{y^3+y}\,dy$.

   A. $\int(\frac{3}{y} + \frac{1}{y^2+1})\,dy = 3\ln|y| + \tan^{\leftarrow}(y) + C$

   B. $\int(\frac{-1}{y} + \frac{3}{y^2+1})\,dy = -\ln|y| + 3\tan^{\leftarrow}(y) + C$

   C. $\int(\frac{2}{y} + \frac{4y}{y^2+1})\,dy = 2\ln|y| + 2\ln|y^2+1| + C$

   D. $\int(\frac{4}{y} + \frac{2y}{y^2+1})\,dy = 4\ln|y| + \ln|y^2+1| + C$

5. Use the washer method to find the volume of the solid of revolution obtained by rotating the triangle with vertices $(1,1),(1,2),(0,2)$ around the y-axis.

   A. $\pi \int_1^2 ((1)^2 - (2-y)^2)\, dy = \frac{2\pi}{3}$

   B. $\pi \int_0^2 ((x+2)^2 - (2)^2)\, dx = \frac{32\pi}{3}$

   C. $2\pi \int_0^1 (y+1)(3-y)\, dy = \frac{22\pi}{3}$

   D. $2\pi \int_1^2 (x+3)(x)\, dx = \frac{41\pi}{3}$

6. Use the cylindrical shell method to find the volume of the solid of revolution obtained by rotating the triangle with vertices $(1,1),(1,2),(0,2)$ around the y-axis.

   A. $\pi \int_1^2 ((2y)^2 - (1)^2)\, dy = \frac{22\pi}{3}$

   B. $\pi \int_0^2 ((3-x)^2 - (x)^2)\, dx = \frac{32\pi}{3}$

   C. $2\pi \int_1^2 (y+3)(y)\, dy = \frac{41\pi}{3}$

   D. $2\pi \int_0^1 (x)(x)\, dx = \frac{2\pi}{3}$

7. A cylindrical tank of height 3 meters and diameter 4 meters has a cross-sectional area of 4π square meters at any height. Find the work in Joules required to empty the tank, assuming that the tank is initially full of salt water weighing $10,000$ newtons for every cubic meter.

   A. $\int_0^4 30000\pi(y-4)\, dy = 240000\pi$

   B. $\int_3^4 120000\pi(y)\, dy = 420000\pi$

   C. $\int_1^4 60000\pi(y)(3+y)\, dy = 2610000\pi$

   D. $\int_0^3 40000\pi(3-y)\, dy = 180000\pi$