MAT 132
Midterm 1 Spring 2017

Name: _____ **ID:** _____

Problem	1 (10 pts)	2 (10 pts)	3 (10 pts)	4 (10 pts)	5 (10 pts)	6 (10 pts)	7 (15 pts)	8 (25 pts)	Total (100 pts)
Score									

Instructions:

(1) Fill in your name and Stony Brook ID number at the top of this cover sheet.

(2) This exam is closed-book and closed-notes; no calculators, no phones.

(3) Leave your answers in exact form (e.g. $\sqrt{2}$, not ≈ 1.4) and simplify them as much as possible (e.g. 1/2, not 2/4) to receive full credit.

(4) Answer all questions in the space provided. If you need more room use the blank backs of the pages.

(5) Show your work; correct answers alone will receive only partial credit.

Evaluate the following integrals. Each part worths 10 points:

1. $\displaystyle\int_0^1 \frac{\arctan^2(x)+1}{x^2+1}\,dx$

2. $\displaystyle\int e^{3t}\cos(2t)\,dt$

3. $\displaystyle\int_1^3 \frac{3x+1}{x^2-2x-15}\,dx$

4. $\displaystyle\int x\ln(x)^2\,dx$

5. $\displaystyle\int \frac{\cos(x)\sin(x)}{2-\cos(x)}\,dx$

6. $\displaystyle\int_0^2 t^3 e^{t^2}\,dt$

7. (15 points) Albert's boomerang has the shape of the region enclosed by the parabolas $y = x^2 - 3x + 3$ and $y = 2x^2 - 6x + 5$. Find the area of his boomerang.

8. (25 points) Let $\mathcal{R}$ be the region obtained by rotating the region enclosed by the x-axis, y-axis, $x = \frac{\pi}{3}$, and the curve $y = \cos(x)$.

   (a) Sketch the shape of this region in the coordinate plane.

   (b) Let $\mathcal{S}$ be the solid given by rotating the region $\mathcal{R}$ about the y-axis. Find the volume of $\mathcal{S}$.

   (c) Let $\mathcal{T}$ be the solid given by rotating the region $\mathcal{R}$ about the horizontal line $y = 2$. Find the volume of $\mathcal{T}$.