# MATH 142: EXAM 01

BLAKE FARMAN
UNIVERSITY OF SOUTH CAROLINA

Answer the questions in the spaces provided on the question sheets and turn them in at the end of the class period. Unless otherwise stated, all supporting work is required. It is advised, although not required, that you check your answers. You may **not** use any calculators.

Name: _____

| Problem | Points Earned | Points Possible |
|---|---|---|
| 1 | | 20 |
| 2 | | 20 |
| 3 | | 20 |
| 4 | | 20 |
| 5 | | 20 |
| Bonus | | 10 |
| Total | | 100 |

*Date*: July 11, 2014.

## 1. Problems

For each of the following problems, decide which method of integration is appropriate and compute the given integrals. You will find some useful trigonmetric identities on the last page. If you need more space for a problem, use the back of the page.

**1** (20 Points)**.** *Compute the following integrals.*

*(a)* $\displaystyle\int \theta \cos(\theta^2) d\theta.$

*(b)* $\displaystyle\int \theta^3 \cos(\theta^2) d\theta.$

**2** (20 Points)**.** *Compute* $\displaystyle\int \frac{dx}{\sqrt{x^2+16}}$.

**3** (20 Points)**.** *Compute* $\displaystyle\int \cos^2(\theta)\tan^3(\theta)d\theta.$

**4** (20 Points)**.** *Compute* $\int 2x \tan(x^2) dx$.

**5** (20 Points)**.** *Compute* $\displaystyle\int \frac{x}{x^2+x-2}dx.$

**6** (Bonus - 10 points)**.** *Compute* $\int \sqrt{\dfrac{1-x}{1+x}}dx.$

## 2. Useful Formulae

- $\sin^2(\theta) + \cos^2(\theta) = 1$.
- $\tan^2(\theta) + 1 = \sec^2(\theta)$.
- $\cot^2(\theta) + 1 = \csc^2(\theta)$.
- $2\sin^2(\theta) = 1 - \cos(2\theta)$.
- $2\cos^2(\theta) = 1 + \cos(2\theta)$.
- $\sin(2\theta) = 2\sin(\theta)\cos(\theta)$.
- $2\sin(\theta)\cos(\varphi) = \sin(\theta - \varphi) + \sin(\theta + \varphi)$.
- $2\sin(\theta)\sin(\varphi) = \cos(\theta - \varphi) - \cos(\theta + \varphi)$.
- $2\cos(\theta)\cos(\varphi) = \cos(\theta - \varphi) + \cos(\theta + \varphi)$.