Math 142, Final Exam Spring 2014

Write everything on the blank paper provided. **You should KEEP this piece of paper.** If possible: return the problems in order (use as much paper as necessary), use only one side of each piece of paper, and leave 1 square inch in the upper left hand corner for the staple. If you forget some of these requests, don't worry about it – I will still grade your exam.

The exam is worth 100 points. Each problem is worth 10 points. Your work must be coherent, complete, and correct. $\boxed{CIRCLE}$ your answer. **CHECK** your answer whenever possible.

No Calculators or Cell phones.

1. Rotate the region between $y^2 - 2y - x = 0$ and $y - x = 0$ about the line $y = -3$. Find the volume of the resulting solid. **You must draw a meaningful picture. Write in complete sentences. Your work must be coherent, complete, and correct.**

2. Does $\sum_{k=1}^{\infty} \sin(\frac{1}{k^2})$ converge? Justify your answer. **Write in complete sentences. Your work must be coherent, complete, and correct.**

3. Where does $f(x) = \sum_{n=1}^{\infty} \frac{(x-3)^n}{\sqrt{n}2^n}$ converge? **Write in complete sentences. Your work must be coherent, complete, and correct.**

4. Find the third Taylor polynomial $T_3(x)$ for $f(x) = x^{1/3}$ about $a = 1$. **Write in complete sentences. Your work must be coherent, complete, and correct.**

5. Estimate how close $T_3(x)$ about $a = 1$ is to $f(x) = x^{1/3}$ when $\frac{9}{10} < x < \frac{11}{10}$. **Write in complete sentences. Your work must be coherent, complete, and correct.**

6. Find $\int \frac{2x^2-x+3}{(x-1)^3} dx$. **Check your answer. Your work must be coherent, complete, and correct.**

7. Find $\int e^{3x} \cos(4x) dx$. **Check your answer. Your work must be coherent, complete, and correct.**

PLEASE TURN OVER!

8. Find $\int \sin^7 x dx$. **Check your answer. Your work must be coherent, complete, and correct.**

9. Estimate how close $\sum_{n=1}^{10} \frac{1}{n^2}$ is $\sum_{n=1}^{\infty} \frac{1}{n^2}$. **Write in complete sentences. Your work must be coherent, complete, and correct.**

10. Estimate $\int_0^{1/10} \cos(x^3) dx$ with an error at most 10^{-10} . **Write in complete sentences. Your work must be coherent, complete, and correct.**