Name _____ Rec. Instr. _____

Signature _____ Rec. Time _____

Math 221 – Exam 1 – January 30, 2018

No books, calculators, or notes are allowed. Please make sure that your cell phone is turned off. You will have 75 minutes to complete the exam.

SHOW YOUR WORK!

Problem	Points	Points Possible	Problem	Points	Points Possible
1		20	6		10
2		10	7		10
3		10	8		10
4		10	9		10
5		10	**Total Score**		**100**

$\sin(ax)\sin(bx) = \frac{1}{2}\cos((a-b)x) - \frac{1}{2}\cos((a+b)x)$

$\cos(ax)\cos(bx) = \frac{1}{2}\cos((a-b)x) + \frac{1}{2}\cos((a+b)x)$

$\sin(ax)\cos(bx) = \frac{1}{2}\sin((a-b)x) + \frac{1}{2}\sin((a+b)x)$

$$\sin^2(x) = \frac{1-\cos(2x)}{2} \qquad \cos^2(x) = \frac{1+\cos(2x)}{2}$$

$$\int \tan(x)\,dx = \ln|\sec(x)| + C \qquad \int \sec(x)\,dx = \ln|\sec(x)+\tan(x)| + C$$

$$\int \frac{dx}{\sqrt{a^2-x^2}} = \arcsin\left(\frac{x}{a}\right) + C \qquad \int \frac{dx}{a^2+x^2} = \frac{1}{a}\arctan\left(\frac{x}{a}\right) + C$$

$$\int \frac{dx}{x\sqrt{x^2-a^2}} = \frac{1}{a}\text{arcsec}\left(\frac{x}{a}\right) + C$$

$$\int \sin^n(x)\,dx = -\frac{\sin^{n-1}(x)\cos(x)}{n} + \frac{n-1}{n}\int \sin^{n-2}(x)\,dx$$

$$\int \cos^n(x)\,dx = \frac{\cos^{n-1}(x)\sin(x)}{n} + \frac{n-1}{n}\int \cos^{n-2}(x)\,dx$$

$$\int \tan^n(x)\,dx = \frac{\tan^{n-1}(x)}{n-1} - \int \tan^{n-2}(x)\,dx$$

$$\int \sec^n(x)\,dx = \frac{\sec^{n-2}(x)\tan(x)}{n-1} + \frac{n-2}{n-1}\int \sec^{n-2}(x)\,dx$$

1. Evaluate the following integrals.

A. (5 points) $\int e^{2x}\,dx$

B. (5 points) $\int \frac{\ln(x)}{x}\,dx$

C. (10 points) $\int x^2 \ln(x) dx$

2. (10 points) Evaluate $\displaystyle\int_0^1 \frac{12x^2+6}{(2x^3+3x+1)^2}\,dx.$

3. (10 points) Evaluate $\displaystyle\int x\sqrt{x+5}\,dx.$

4. (10 points) Evaluate $\int e^x \cos(x)\, dx$.

5. (10 points) A particle moving along a straight line has velocity $v(t) = t^2 \cdot e^t$ ft/min after t minutes. How far does the particle travel in the first minute?

6. (10 points) Evaluate $\int \tan^6(\theta)\sec^4(\theta)\,d\theta$.

7. (10 points) Find the volume of the solid obtained by rotating the region bounded by $y = 3\sin(x)$, the x-axis, and $x = \frac{\pi}{2}$ around the x-axis.

8. (10 points) By using a trigonometric substitution, evaluate $\int \frac{dx}{\sqrt{1+x^2}}$.

9. (10 points) By using a trigonometric substitution, evaluate $\int \sqrt{9-x^2}\, dx$.