Math 1120-101 # Test #1 **February 10^{th}, 2014**

Name: ______________________________ **Be sure to show your work!**

$\sin^2(x) = \frac{1}{2}\Big(1 - \cos(2x)\Big)$ $\frac{d}{dx}\Big[\tan(x)\Big] = \sec^2(x)$ $\frac{d}{dx}\Big[\operatorname{asin}(x)\Big] = \frac{1}{\sqrt{1-x^2}}$

1. (30 points) Basic Integrals

(a) $\displaystyle\int x^2 e^{3x}\, dx$

(b) $\displaystyle\int_0^2 \frac{x^2+1}{x^3+3x+1}\, dx$

(c) $\displaystyle\int_0^{\pi/2} \cos^3(x)\, dx$

2. (30 points) More Integrals

(a) $\displaystyle\int \ln(x)\,dx$

(b) $\displaystyle\int \sec^4(x)\,dx$

(c) $\displaystyle\int e^x \sin(2x)\,dx$

3. (8 points) Write down the "forms" we would use to find the partial fraction decomposition of...

$$\frac{9x^7 - 11x^5 + x^4 - 2x + 1}{x(x+5)^3(x^2+2x+6)^2}$$

4. (20 points) More Integrals

(a) $\displaystyle\int \frac{1}{x^2+2x+2}\,dx$

(b) $\displaystyle\int \frac{2x^2-x-1}{x(x+1)^2}\,dx$

5. (12 points) We know that the area inside the circle $x^2+y^2=4$ is 4π. Show this using a definite integral. At some point your work should involve a trigonometric substitution.

Math 1120-108

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February 10^{th}, 2014

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$\sin^2(x) = \frac{1}{2}\Big(1 - \cos(2x)\Big)$ $\qquad \frac{d}{dx}\Big[\tan(x)\Big] = \sec^2(x)$ $\qquad \frac{d}{dx}\Big[\operatorname{asin}(x)\Big] = \frac{1}{\sqrt{1-x^2}}$

1. (27 points) Basic Integrals

(a) $\displaystyle\int x^2 \cos(3x)\, dx$

(b) $\displaystyle\int_1^4 \frac{e^{\sqrt{x}}}{\sqrt{x}}\, dx$

(c) $\displaystyle\int_0^{\pi} \cos^2(x)\, dx$

2. (30 points) More Integrals

(a) $\displaystyle\int \arcsin(x)\,dx$

(b) $\displaystyle\int \sin^6(x)\cos^3(x)\,dx$

(c) $\displaystyle\int e^{-x}\cos(x)\,dx$

3. (8 points) Write down the "forms" we would use to find the partial fraction decomposition of...

$$\frac{-3x^5+2x^4-x^2+7}{x^2(x-3)(x^2+x+5)^2}$$

4. (28 points) More Integrals

(a) $\displaystyle\int \frac{1}{x^2+6x+13}\,dx$

(b) $\displaystyle\int \frac{2x^2+3x-7}{(x-3)(x^2+1)}\,dx$

(c) $\displaystyle\int \frac{x^3}{\sqrt{1-x^2}}\,dx$

5. (7 points) Simplify $\sin\left(\arctan\left(\frac{x}{3}\right)\right)$. Draw a triangle to back up your answer.