Math 120: Calculus Name:____________________

Exam III Tutorial Instructor:____________________

April 16, 1996 Tutorial Section:____________________

Calculators are not allowed. Hand in this answer page only. Record your answers to the multiple choice problems by placing an × through one letter for each problem on this answer sheet. There are 16 multiple choice questions, worth 6 points each. An additional 4 points will be given for your correct tutorial section number.

You are taking this exam under the honor code.

Evaluate $\int xe^{2x}dx$

$\frac{1}{2}xe^{2x} - \frac{1}{4}e^{2x} + C$ $\frac{1}{2}xe^{2x} - e^{2x} + C$ $xe^{2x} - e^{2x} + C$ $2xe^{2x} - 4e^{2x} + C$ $2xe^{2x} - e^{2x} + C$

Evaluate $\int_0^{\pi/2} \cos^2 x \; dx$

$\frac{\pi}{4}$ $\frac{\pi}{4} + \frac{1}{4}$ 0 $\frac{\pi}{4} - \frac{1}{4}$ π

In the partial fraction decomposition

$$\frac{2x+1}{x^3 - x} = \frac{A}{x} + \frac{B}{x-1} + \frac{C}{x+1}$$

find the value of B. (You don't have to find the values of A or C.) $3/2$ 1 -1 $2/3$ $-2/3$

Use long division to divide $\frac{x^3+x^2+x+1}{x^2-1}$ $x+1+\frac{2x+2}{x^2-1}$ $x+1+\frac{2}{x^2-1}$ $x+1+\frac{2x}{x^2-1}$ $x+\frac{2x+1}{x^2-1}$ $x+\frac{x+1}{x^2-1}$

Evaluate $\int_{1/2}^{\sqrt{3}/2} \left(\frac{dx}{x^2\sqrt{1-x^2}} \right)$

$\sqrt{3} - \frac{1}{\sqrt{3}}$ $\frac{\pi}{3} - \frac{\pi}{6}$ $\frac{\sqrt{3}}{2} - \frac{1}{2}$ $\frac{1}{2} - \sqrt{3}$ $\frac{1}{\sqrt{3}} - \frac{1}{2}$

Evaluate $\int \frac{x}{x^2+1}dx$ $\frac{1}{2}\ln|1+x^2|+C$ $\ln|1+x^2|+C$ $-\frac{1}{2}\ln|1+x^2|+C$ $\frac{1}{2}|1+x^2|^2+C$ $-2\ln|1+x^2|+C$

Evaluate $\int_1^e \sqrt{x}\ln x \; dx$

$\frac{2}{9}e^{3/2} + \frac{4}{9}$ $\frac{2}{9}e^{3/2} - \frac{2}{9}$ $\frac{2}{9}e^{3/2} + \frac{2}{3}$ $\frac{2}{9}e^{3/2} - \frac{2}{3}$ $\frac{2}{9}e^{3/2} - 1$

If you were to use integration by parts to evaluate $\int x^3 \sin x \; dx$, you would get

$$\int x^3 \sin x \; dx = -x^3 \cos x - \underline{\qquad ?? \qquad}.$$

What should be in the blank? (Notice that it's a minus sign in front of the blank.)

$-3\int x^2\cos x\ dx$ $3\int x^2\cos x\ dx$ $-\frac{1}{3}\int x^2\cos x\ dx$ $+\frac{1}{3}\int x^2\cos x\ dx$ $-\frac{1}{3}\int \cos x^2\ dx$

Evaluate $\int_0^{\pi/2} \sin^3 x\ dx$.

2/3 -1 0 1 1/3

Suppose you want to evaluate $\int_1^4 \frac{x^3}{\sqrt{2x^2+7}}\ dx$ using a trig substitution. What trig substitution should you use?

$x = \frac{\sqrt{7}}{\sqrt{2}}\tan\theta$ $x = \frac{\sqrt{2}}{\sqrt{7}}\tan\theta$ $x = \frac{2}{7}\tan\theta$ $x = \frac{7}{2}\tan\theta$ $x = -\frac{7}{2}\tan\theta$

Evaluate $\int \frac{x}{x^2-2x+1}\ dx$

$\ln|x-1| - \frac{1}{x-1} + C$ $\ln|x-1| + \frac{1}{x-1} + C$ $\ln|x-1| + \frac{1}{(x-1)^2} + C$ $\ln|x-1| - \frac{1}{(x-1)^2} + C$ $-\ln|x-1| + \frac{1}{x-1} + C$

Evaluate $\int \frac{(\sin x)(\cos x)}{1+\sin x}\ dx$

$\sin x - \ln(1+\sin x) + C$ $\ln(1+\sin x) + C$ $\frac{(1/2)\sin^2 x}{\ln(1+\sin x)} + C$ $(1/2)\sin^2 x - \ln(1+\sin x) + C$ $(\cos x)\cdot\ln(1+\sin x) + C$

Suppose you want to evaluate $\int_0^1 x^3\sqrt{4-x^2}\ dx$ using the trig substitution $x = 2\sin\theta$. What new integal do you then get?

$32\int_0^{\pi/6} \sin^3\theta\cos^2\theta\ d\theta$ $32\int_0^{\pi/2} \sin^3\theta\cos^2\theta\ d\theta$ $32\int_0^{1} \sin^3\theta\cos^2\theta\ d\theta$ $32\int_0^{\pi/3} \sin^3\theta\cos^2\theta\ d\theta$ $32\int_0^{\pi} \sin^3\theta\cos^2\theta\ d\theta$

Suppose you want to evaluate $\int_{\square}^{\square} (1-4x^2)^{15} dx$ using a trig substitution. (I don't care about the limits of integration in this problem.) What integral do you then get?

$\frac{1}{2}\int_{\square}^{\square} \cos^{31}\theta\ d\theta$ $\frac{1}{2}\int_{\square}^{\square} \sin^{30}\theta\cdot\cos\theta\ d\theta$ $\frac{1}{2}\int_{\square}^{\square} \cos^{16}\theta\ d\theta$ $\frac{1}{2}\int_{\square}^{\square} \sin^{15}\theta\cdot\cos\theta\ d\theta$ $\frac{1}{2}\int_{\square}^{\square} \cos^{18}\theta\ d\theta$

Evaluate $\int \cos^5 x\ dx$. Hint: use the fact that $\cos^5 x = \cos^4 x\cdot\cos x$.

$\sin x - \frac{2}{3}\sin^3 x + \frac{1}{5}\sin^5 x + C$ $\frac{1}{6}\cos^6 x + C$ $\left(x - \frac{1}{3}\sin^3 x\right)^2 + C$ $\frac{1}{3}\left(1-\sin^2 x\right)^3 + C$ $\sin x + \sin^2 x + \sin^3 x + \sin^4 x + \sin^5 x + C$

Evaluate $\int \ln x\ dx$

$x\ln x - x + C$ $\frac{1}{2}(\ln x)^2 + C$ $x\ln x + C$ $\frac{1}{x}\ln x + x + C$ $e^x + C$