

CALCULUS II QUIZ 30 DR. RAPALJE

(Use separate paper if necessary)

1. $\int \sec 3x \tan 3x \, dx$

2. $\int x^2 e^{x^3} \, dx$

3. $\int x \arctan x \, dx$

4. $\int \sin^2 3x \, dx$

5. $\int \frac{dx}{(25-x^2)^{3/2}}$

6. $\int \frac{dx}{(x^2+9)^2}$

CALCULUS II QUIZ 3 Solutions Dr. RAPALJE

(Use separate paper if necessary)

1. $\int \sec 3x \tan 3x dx$

$= \frac{1}{3} \sec 3x + C$

2. $\int x^2 e^{x^3} dx$

Let $u = x^3$
 $du = 3x^2 dx$

$\int e^u \frac{du}{3}$

$= \frac{1}{3} e^{x^3} + C$

3. $\int x \arctan x dx$

$u = \arctan x \quad dv = x dx$
 $du = \frac{1 dx}{x^2+1} \quad v = \frac{x^2}{2}$

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

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

$= \frac{x^2}{2} \arctan x - \frac{1}{2} \int (1 - \frac{1}{x^2+1}) dx$

$= \frac{x^2}{2} \arctan x - \frac{1}{2} x + \frac{1}{2} \arctan x + C$

4. $\int \sin^2 3x dx$

$[\sin^2 u = \frac{1-\cos 2u}{2}]$

$= \int \frac{1-\cos 6x}{2} dx$

$= \frac{1}{2} [x - \frac{\sin 6x}{6}] + C$

$= \frac{1}{2} x - \frac{1}{12} \sin 6x + C$

5. $\int \frac{dx}{(25-x^2)^{3/2}}$



$x = 5 \sin \theta$
 $dx = 5 \cos \theta d\theta$
 $\sqrt{25-x^2} = 5 \cos \theta$

$= \int \frac{5 \cos \theta d\theta}{(5 \cos \theta)^3}$

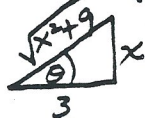
$= \frac{1}{25} \int \frac{1}{\cos^2 \theta} d\theta$

$= \frac{1}{25} \int \sec^2 \theta d\theta$

$= \frac{1}{25} \tan \theta + C$

$= \frac{1}{25} \frac{x}{\sqrt{25-x^2}} + C$

6. $\int \frac{dx}{(x^2+9)^2}$



$x = 3 \tan \theta$
 $dx = 3 \sec^2 \theta d\theta$
 $\sqrt{x^2+9} = 3 \sec \theta$

$\int \frac{3 \sec^2 \theta d\theta}{(3 \sec \theta)^4}$

$= \frac{1}{27} \int \frac{d\theta}{\sec^2 \theta}$

$= \frac{1}{27} \int \cos^2 \theta d\theta$

$= \frac{1}{27} \int \frac{1+\cos 2\theta}{2} d\theta$

$= \frac{1}{54} [\theta + \frac{\sin 2\theta}{2}]$

$= \frac{1}{54} [\arctan \frac{x}{3} + \frac{x}{\sqrt{x^2+9}} \cdot \frac{3}{\sqrt{x^2+9}}] + C$

7. $\int x \cos x dx$

Let $u = x \quad dv = \cos x dx$
 $du = dx \quad v = \sin x$

$= x \sin x - \int \sin x dx$

$= x \sin x + \cos x + C$

$\frac{1}{54} [\arctan \frac{x}{3} + \frac{3x}{x^2+9}] + C$