

What month is your birthday? _____

What are the first 2 digits of your address? _____

What are the last 2 digits of your zip code? _____

What are the last 2 digits of your social security number? _____

[IF YOU DO NOT HAVE A SOCIAL SECURITY NUMBER,
USE YOUR STUDENT ID NUMBER]

SCORE: ____ / 30 POINTS

NO CALCULATORS ALLOWED**YOU MUST SHOW PROPER CALCULUS LEVEL WORK
(INCLUDING SANITY CHECKS WHERE RELEVANT) TO EARN FULL CREDIT**

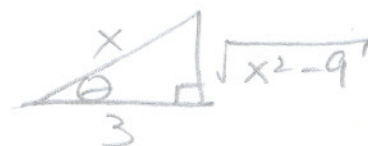
Find $\int \frac{x^2}{\sqrt{x^2-9}} dx$.

SCORE: ____ / 7 POINTS

① $x = 3 \sec \theta \rightarrow \sec \theta = \frac{x}{3}$

$dx = 3 \sec \theta \tan \theta d\theta$

$\int \frac{9 \sec^2 \theta \text{ ①}}{\sqrt{9 \sec^2 \theta - 9}} \cdot 3 \sec \theta \tan \theta d\theta \text{ ①}$



$= \int \frac{9 \sec^2 \theta}{3 \tan \theta} 3 \sec \theta \tan \theta d\theta$

★ FOR EACH QUESTION:
SUBTRACT $\frac{1}{2}$ IF
MISSING "+C"
SUBTRACT $\frac{1}{2}$ FOR
EACH MISSING
ABSOLUTE VALUE

① $= 27 \int \sec^3 \theta d\theta$

① $= 27 \left(\frac{1}{2} \sec \theta \tan \theta + \frac{1}{2} \ln |\sec \theta + \tan \theta| \right) + C$

$= \frac{27}{2} \frac{x}{3} \frac{\sqrt{x^2-9}}{3} + \frac{27}{2} \ln \left| \frac{x}{3} + \frac{\sqrt{x^2-9}}{3} \right| + C = \frac{3}{2} x \sqrt{x^2-9} + \frac{27}{2} \ln |x + \sqrt{x^2-9}| + C$

① SCORE: ____ / 7 POINTS

Find $\int \frac{x+7}{(x-1)(x+1)^2} dx$.

SEE 7:30 VERSION B

Find $\int x^2 (\ln x)^2 dx$.

SCORE: ___ / 6 POINTS

SEE 7:30 VERSION B

Find $\int e^{4x} \sin 3x dx$.

$$= \underbrace{\frac{1}{4} e^{4x} \sin 3x}_{\textcircled{\frac{1}{2}}} - \underbrace{\frac{3}{16} e^{4x} \cos 3x}_{\textcircled{\frac{1}{2}}} - \frac{9}{16} \int e^{4x} \sin 3x dx \textcircled{1}$$

$\frac{u}{\sin 3x} + \frac{dv}{e^{4x}}$
 $3 \cos 3x - \frac{1}{4} e^{4x}$
 $-9 \sin 3x + \frac{1}{16} e^{4x}$

so,

$$\underbrace{\frac{25}{16} \int e^{4x} \sin 3x dx}_{\textcircled{1}} = \frac{1}{4} e^{4x} \sin 3x - \frac{3}{16} e^{4x} \cos 3x$$

SEE ALSO

9:30 VERSION D

$$\int e^{4x} \sin 3x dx = \underbrace{\frac{4}{25} e^{4x} \sin 3x}_{\textcircled{\frac{1}{2}}} - \underbrace{\frac{3}{25} e^{4x} \cos 3x}_{\textcircled{\frac{1}{2}}} + C$$

Find $\int \frac{17-x^2}{x^2+2x-15} dx$.

SCORE: ___ / 4 POINTS

SEE 7:30 VERSION B