Circle your Instructor: Faudree, Williams, Zirbes ________ / 15

Name: ______________________________

This is a 30 minute quiz. There are 15 problems. Books, notes, calculators or any other aids are prohibited. Calculators and notes are not allowed. **Your answers should be simplified unless otherwise stated.** They should begin $y' =$ or $f'(x) =$ or $dy/dx =$, etc. There is no partial credit. If you have any questions, please raise your hand.

Circle your final answer.

For each function below, find the definite or indefinite integral.

1. $\int_0^1 (1 + 8v^3 - 24v^7)dv = \left(v + \frac{8}{4}v^4 - \frac{24}{8}v^8\right)\Big|_0^1$

$= (v + 2v^4 - 3v^8)\Big|_0^1$

$= 1 + 2 - 3 - 0$

$= \boxed{0}$ ✓

2. $\int \cos(5\pi x)dx = \boxed{\frac{1}{5\pi}\sin(5\pi x) + C}$ ✓

3. $\int \frac{t^2 - 2}{\sqrt{t}}dt = \int (t^{3/2} - 2t^{-1/2})dt$

$= \boxed{\frac{2}{5}t^{5/2} - 4t^{1/2} + C}$

$= \boxed{\frac{2}{5}\sqrt{t^5} - 4\sqrt{t} + C}$ ✓

4. $\int \frac{3x^4}{2+x^5}dx = \int \frac{3x^4}{u} \cdot \frac{du}{5x^4}$

$u = 2+x^5$

$du = 5x^4 dx$

$\frac{du}{5x^4} = dx$

$= \frac{3}{5}\int \frac{1}{u}\, du$

$= \frac{3}{5}\ln|u| + C$

$= \boxed{\frac{3}{5}\ln|2+x^5| + C}$ ✓

5. $\int_0^1 \frac{5}{x^2+1}dx = 5\tan^{-1}x \Big|_0^1$

$= 5(\tan^{-1}1 - \tan^{-1}0)$

$= 5(\pi/4)$

$= \boxed{\frac{5\pi}{4}}$ ✓

6. $\int \frac{\sin x}{\cos^3 x}dx = -\int \frac{1}{u^3}du$

$u = \cos x$

$du = -\sin x\, dx$

$= -\int u^{-3}\, du$

$= -\frac{u^{-2}}{(-2)} + C$

$= \boxed{\frac{1}{2}(\cos x)^{-2} + C}$

$= \boxed{\frac{1}{2\cos^2 x} + C}$

$= \boxed{\frac{1}{2}\sec^2 x + C}$ ✓

7. $\int \frac{4x}{\sqrt{1-x^2}}dx = \int \frac{4x}{\sqrt{u}} \cdot \frac{du}{(-2x)}$

$u = 1-x^2$

$du = -2x\, dx$

$\frac{du}{-2x} = dx$

$= -2\int u^{-1/2}\, du$

$= -4u^{1/2} + C$

$= \boxed{-4\sqrt{1-x^2} + C}$ ✓

8. $\displaystyle\int_0^1 (4+9^x)\,dx = \left(4x + \frac{9^x}{\ln 9}\right)\Big|_0^1$

$= 4 + \frac{9}{\ln 9} - \left(0 + \frac{1}{\ln 9}\right)$

$= \boxed{4 + \frac{8}{\ln 9}}$

9. $\displaystyle\int e^{-2r}\,dr = \boxed{-\frac{1}{2} e^{-2r} + C}$

10. $\displaystyle\int \sec\theta(\sec\theta + \tan\theta)d\theta = \int (\sec^2\theta + \sec\theta\tan\theta)\,d\theta$

$= \boxed{\tan\theta + \sec\theta + C}$

11. $\displaystyle\int \frac{e^{1/x}}{x^2}dx = -\int e^u\,du$

$u = 1/x$

$du = -1/x^2\,dx$

$= -e^u + C$

$= \boxed{-e^{1/x} + C}$

12. $\displaystyle\int \frac{1}{(9x-1)^{1/3}}dx = \frac{1}{9}\int u^{-1/3}\,du$

$u = 9x-1$
$du = 9\,dx$

$$= \frac{1}{9}\frac{3}{2}u^{2/3} + C$$
$$= \boxed{\frac{1}{6}(9x-1)^{2/3} + C}$$ ✓

13. $\displaystyle\int \frac{\ln x}{x}dx = \int u\,du$

$u = \ln x$
$du = \frac{1}{x}dx$

$$= \frac{1}{2}u^2 + C$$
$$= \boxed{\frac{1}{2}(\ln x)^2 + C}$$
$$= \boxed{\frac{1}{2}\ln^2 x + C}$$ ✓

14. $\displaystyle\int \left(\sqrt{3x} + \frac{x}{5} + \frac{5}{x}\right)dx = \int\left(\sqrt{3}\sqrt{x} + \frac{1}{5}x + 5\cdot\frac{1}{x}\right)dx$

$$= \sqrt{3}\,\frac{2}{3}x^{3/2} + \frac{1}{10}x^2 + 5\ln|x| + C$$
$$= \boxed{\frac{2\sqrt{3}}{3}x^{3/2} + \frac{1}{10}x^2 + 5\ln|x| + C}$$ ✓

OR $\frac{1}{3}\frac{2}{3}(3x)^{3/2} = \frac{2}{9}(3x)^{2/3}$

15. $\displaystyle\int \cos x\cos(\sin x)dx = \int \cos u\,du$

$u = \sin x$
$du = \cos x\,dx$

$$= \sin u + C$$
$$= \boxed{\sin(\sin x) + C}$$ ✓