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. $\int_0^1 (1 - 15v^4 + 16v^7)dv$ $= \left(v - \frac{15}{5}v^5 + \frac{16}{8}v^8\right)\Big|_0^1$

$= (v - 3v^5 + 2v^8)\Big|_0^1$

$= 1 - 3 + 2 - 0$

$= 0$ ✓

2. $\int \cos(3\pi x)dx$ $= \boxed{\frac{1}{3\pi}\sin(3\pi x) + C}$ ✓

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. $\displaystyle\int \frac{7x^2}{2+x^3}dx = \int \frac{7x^2}{u} \cdot \frac{du}{3x^2}$

$u = 2+x^3$
$du = 3x^2 dx$
$\frac{du}{3x^2} = dx$

$= \frac{7}{3}\int \frac{1}{u} du$

$= \frac{7}{3} \ln|u| + C$

$= \boxed{\frac{7}{3} \ln|2+x^3| + C}$

5. $\displaystyle\int_0^1 \frac{6}{x^2+1}dx = 6 \tan^{-1} x \Big|_0^1$

$= 6(\tan^{-1} 1 - \tan^{-1} 0)$

$= \boxed{\frac{6\pi}{4}}$

$= \boxed{\frac{3\pi}{2}}$

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

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

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

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

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

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

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

7. $\displaystyle\int \frac{e^{1/x}}{x^2}dx = \int \frac{e^u}{x^2}(-x^2)du$

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

$= -\int e^u du$

$= -e^u + C$

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

8. $\int \frac{4x}{\sqrt{1-x^2}}dx = \frac{4}{-2}\int \frac{1}{\sqrt{u}}\,du$

$u = 1-x^2$

$du = -2x\,dx$

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

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

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

$= \boxed{-4\sqrt{1-x^2}+C}$

9. $\int_0^1 (6+10^x)\,dx = \left(6x + \frac{10^x}{\ln 10}\right)\Big|_0^1$

$= 6 + \frac{10}{\ln 10} - \left(0 + \frac{1}{\ln 10}\right)$

$= \boxed{6 + \frac{9}{\ln 10}}$

10. $\int e^{-5r}dr = \boxed{-\frac{1}{5}e^{-5r} + C}$

11. $\int \sec\theta(\sec\theta + \tan\theta)d\theta = \int(\sec^2\theta + \sec\theta\tan\theta)d\theta$

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

12. $\int \frac{1}{(6x-1)^{1/3}}dx = \frac{1}{6}\int u^{-1/3}\,du$

$u = 6x-1$
$du = 6\,dx$

$= \frac{1}{6}\,\frac{3}{2}u^{2/3} + C$

$= \boxed{\frac{1}{4}(6x-1)^{2/3} + C}$

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

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

$= \frac{1}{2}u^2 + C$

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

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

14. $\int \left(\sqrt{3x} + \frac{x}{2} + \frac{2}{x}\right) dx = \int\left(\sqrt{3}\sqrt{x} + \frac{1}{2}x + 2\cdot\frac{1}{x}\right)dx$

$= \sqrt{3}\frac{2}{3}x^{3/2} + \frac{1}{2}\cdot\frac{1}{2}x^2 + 2\ln|x| + C$

$= \boxed{\frac{2\sqrt{3}}{3}x^{3/2} + \frac{1}{4}x^2 + 2\ln|x| + C}$

$= \boxed{\frac{2\sqrt{3}}{3}x^{3/2} + \frac{1}{4}x^2 + 2\ln|x| + C}$

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

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

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

$= \cos u + C$

$= \boxed{\cos(\cos x) + C}$

OR