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. $\int_0^1 (1 + 8v^3 - 18v^8)dv$ $= v + \frac{8}{4}v^4 - \frac{18}{9}v^9\Big]_0^1 = v + 2v^4 - 2v^9\Big]_0^1$

$= (1+2-2) - (0) = 1$

2. $\int \sin(3\pi x)dx$ $= \frac{1}{3\pi}\int \sin u\, du = -\frac{1}{3\pi}\cos u + C$

let $u = 3\pi x$

$du = 3\pi dx$

$\frac{1}{3\pi}du = dx$

$= -\frac{1}{3\pi}\cos(3\pi x) + C$

3. $\int \frac{5x^2}{2+x^3}dx$ $= \frac{5}{3}\int \frac{du}{u} = \frac{5}{3}\ln|u| + C$

let $u = 2 + x^3$

$du = 3x^2 dx$

$\frac{1}{3}du = x^2 dx$

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

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

$= \tan\theta + \sec\theta + C$

5. $\int_0^1 \frac{9}{1+x^2}dx$ $= 9\arctan x\Big]_0^1 = 9(\arctan 1 - \arctan 0)$

$= 9\left(\frac{\pi}{4} - 0\right) = \frac{9\pi}{4}$

6. $\int \frac{\sin x}{\cos^4 x}dx$ $= -\int u^{-4}\,du = \frac{1}{3}u^{-3} + C = \frac{1}{3}(\cos x)^{-3} + C$

$u = \cos x$

$du = -\sin x\, dx$

7. $\int \frac{e^{1/x}}{x^2}dx$ $= -\int e^u\,du = -e^u + C = -e^{x^{-1}} + C$

$u = x^{-1}$

$du = -x^{-2}dx$

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

let $u = 1-x^2$

$du = -2x\,dx$

$-2\,du = 4x\,dx$

$= -4(1-x^2)^{1/2} + C$

9. $\int_0^1 (3+9^x)\,dx = 3x + \frac{9^x}{\ln 9}\Big]_0^1 = \left(3+\frac{9}{\ln 9}\right) - \left(0+\frac{1}{\ln 9}\right)$

$= 3 + \frac{8}{\ln 9}$

10. $\int \left(\sqrt{2x} + \frac{x}{5} + \frac{5}{x}\right)dx = \int \sqrt{2}\,x^{1/2} + \frac{1}{5}x + 5\cdot\frac{1}{x}\,dx$

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

11. $\int e^{-6r}dr = -\frac{1}{6}e^{-6r} + C$

let $u = -6r$

$du = -\frac{1}{6}\,dr$

12. $\int \frac{1}{(7x-1)^{1/3}}dx$ $= \frac{1}{7}\int u^{-1/3}\,du = \frac{1}{7}\cdot\frac{3}{2}\cdot u^{2/3} + C$

$u = 7x-1$

$du = 7\,dx$

$\frac{1}{7}du = dx$

$= \frac{3}{14}(7x-1)^{2/3} + C$

13. $\int \frac{t^2-2}{\sqrt{t}}dt$ $= \int t^{3/2} - 2t^{-1/2}\,dt = \frac{2}{5}x^{5/2} - 4x^{1/2} + C$

14. $\int \frac{\ln x}{x}dx$ $= \frac{1}{2}(\ln x)^2 + C$

let $u = \ln x$

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

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

$= \sin(\sin x) + C$

let $u = \sin x$

$du = \cos x\,dx$