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. $\int_0^1 (1 - 8v^3 + 16v^7)dv = v - \frac{8}{4}v^4 + \frac{16}{8}v^8 \Big]_0^1 = v - 2v^4 + 2v^8 \Big]_0^1$

$= (1-2+2) - (0) = \boxed{1}$

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

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

3. $\int \frac{7x^4}{2+x^5}dx = \frac{7}{5}\int \frac{du}{u} = \frac{7}{5}\ln|u| + C = \boxed{\frac{7}{5}\ln|2+x^5| + C}$

let $u = 2+x^5$

$du = 5x^4 dx$

$\frac{1}{5}du = x^4 dx$

4. $\int \sin(5\pi x)dx = \frac{1}{5\pi}\int \sin u \, du = -\frac{1}{5\pi}\cos u + C$

let $u = 5\pi x$

$du = 5\pi dx$

$\frac{1}{5\pi} du = dx$

$= -\frac{1}{5\pi}\cos(5\pi x) + C$

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

let $u = x^{-1}$

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

$= -e^{x^{-1}} + C$

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

$= 5\left(\frac{\pi}{4} - 0\right) = \frac{5\pi}{4}$

7. $\int \frac{\sin x}{\cos^5 x}dx = -\int u^{-5} du = \frac{1}{4}u^{-4} + C = \frac{1}{4}(\cos x)^{-4} + C$

let $u = \cos x$

$du = -\sin x \, dx$

8. $\int_0^1 (5 + 10^x)\, dx$ $= 5x + \frac{1}{\ln 10} 10^x \Big]_0^1 = \left(5 + \frac{10}{\ln 10}\right) - \left(0 + \frac{1}{\ln 10}\right)$

$= 5 + \frac{9}{\ln 10}$

9. $\int \left(\sqrt{5x} + \frac{x}{3} + \frac{3}{x}\right) dx$ $= \int \left(\sqrt{5} \cdot x^{1/2} + \frac{1}{3} x + 3 \cdot \frac{1}{x}\right) dx$

$= \sqrt{5} \cdot \frac{2}{3} x^{3/2} + \frac{1}{6} x^2 + 3 \ln|x| + C$

$= \frac{2\sqrt{5}}{3} x^{3/2} + \frac{1}{6} x^2 + 3 \ln|x| + c$

10. $\int \frac{t^2 - 2}{\sqrt{t}} dt$ $= \int (t^{3/2} - 2t^{-1/2}) dt = \frac{2}{5} t^{5/2} - 4 t^{1/2} + c$

11. $\int e^{-4r} dr$ $= -\frac{1}{4} \int e^u du = -\frac{1}{4} e^u + c = -\frac{1}{4} e^{-4r} + c$

$u = -4r$

$du = -4\, dr$

$-\frac{1}{4} du = dr$

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

let $u = 1-x^2$

$du = -2x\,dx$

$-2du = 4x\,dx$

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

13. $\int \frac{1}{(8x-1)^{1/3}}dx = \frac{1}{8}\int u^{-1/3}\, du = \frac{1}{8}\cdot\frac{3}{2}\cdot u^{2/3} + C$

$u = 8x-1$

$du = 8dx$

$\frac{1}{8}du = dx$

$= \frac{3}{16}(8x-1)^{2/3} + C$

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

$u = \ln x$

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

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

let $u = \cos x$

$du = -\sin x\, dx$

$-du = \sin x\, dx$

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