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.** 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. $\int_1^2 6t^2 - 4t + 1\, dt$ $= 2t^3 - 2t^2 + t \Big|_1^2 = 16 - 8 + 2 - [2 - 2 + 1]$ $= 9$

2. $\int \cos\theta(2\tan\theta + \sec^3\theta)d\theta$ $= \int 2\sin\theta + \sec^2\theta\, d\theta = -2\cos\theta + \tan\theta + C$

3. $\int \frac{6x^2 - 4x}{x^3 - x^2}dx$ $= \int \frac{6x^2-4x}{u} \cdot \frac{du}{3x^2-2x} = \int \frac{2}{u}\, du = 2\ln|u| + C$

$u = x^3 - x^2$

$du = (3x^2 - 2x)\, dx$

$= 2\ln|x^3 - x^2| + C$

4. $\int 3\cos(10x)dx$ $= \frac{3}{10}\sin(10x) + C$

5. $\int \frac{6e^{\sqrt[3]{x}+2}}{x^{2/3}}dx$ $= \int \frac{6e^u}{x^{2/3}} \cdot 3x^{2/3}\,du = \int 18e^u\,du = 18e^u + C$

$u = x^{1/3} + 2$
$du = \frac{1}{3}x^{-2/3}\,dx$

$= 18e^{\sqrt[3]{x}+2} + C$

6. $\int_{1/2}^{1} \frac{9}{\sqrt{1-x^2}}dx$

note: technically we can't do this since $f(x)$ not defined at $x=1$

$= 9\arcsin(x)\Big|_{1/2}^{1} = 9\arcsin(1) - 9\arcsin(1/2)$

$= \frac{9\pi}{2} - 9\cdot\frac{\pi}{6} = \frac{6\pi}{2} = 3\pi$

7. $\int \frac{2}{x(\ln x)^4}dx$ $= \int \frac{2}{u^4}\,du = -\frac{2}{3}u^{-3} + C$

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

$= -\frac{2}{3}(\ln x)^{-3} + C$

$= \frac{-2}{3(\ln(x))^3} + C$

8. $\int_0^2 (3^x - 5)\,dx$ $= \frac{3^x}{\ln(3)} - 5x \Big|_0^2 = \frac{9}{\ln(3)} - 10 - \left(\frac{1}{\ln(3)} - 0\right)$

$= \frac{8}{\ln(3)} - 10$

9. $\int \left(\sqrt[3]{2x} + \frac{x^2}{7} - \frac{2}{x^2}\right) dx$ $= \int \sqrt[3]{2}\, x^{1/3} + \frac{1}{7}x^2 - 2x^{-2}\,dx = \frac{3\sqrt[3]{2}}{4} x^{4/3} + \frac{1}{21}x^3 + \frac{2}{x} + C$

10. $\int \frac{x^3 - 2x}{\sqrt{x}} dx$ $= \int x^{5/2} - 2x^{1/2}\,dx = \frac{2}{7}x^{7/2} - \frac{4}{3}x^{3/2} + C$

11. $\int e^{5u} du.$ $= \frac{1}{5} e^{5u} + C$

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

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

$= 3\sqrt{1-x^2} + C$

13. $\int \frac{1}{(5x+2)^{1/4}}dx$ $= \int (5x+2)^{-1/4}\,dx = \frac{1}{5}\cdot\frac{4}{3}(5x+2)^{3/4} + C$

$= \frac{4}{15}(5x+2)^{3/4} + C$

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

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

$= -\frac{1}{2}e^{-x^2} + C$

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

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

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