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. $\int_1^2 9t^2 + 2t - 4\,dt$ $= 3t^3 + t^2 - 4t\Big|_1^2 = 24 + 4 - 8 - (3+1-4)$
$= 20$

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

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

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

5. $\int_{1/2}^{1} \frac{3}{\sqrt{1-x^2}}dx$ technically DNE but... $= 3\arcsin(x)\Big|_{1/2}^{1} = 3\cdot\frac{\pi}{2} - 3\cdot\frac{\pi}{6} = \pi$

6. $\int \frac{6x^2-4x}{x^2-x^3}dx$ $= \int \frac{6x^2-4x}{u}\cdot\frac{du}{2x-3x^2} = \int \frac{-2}{u}du$

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

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

or

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

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

8. $\int_0^2 (4^x - 3)\,dx$ $= \frac{4^x}{\ln(4)} - 3x \Big|_0^2 = \frac{16}{\ln 4} - 6 - \left(\frac{1}{\ln 4} - 0\right)$
$= \frac{15}{\ln 4} - 6$

9. $\int \left(\sqrt[3]{2x} - \frac{x^2}{5} + \frac{2}{x^2}\right) dx$ $= \int \sqrt[3]{2}\, x^{1/3} - \frac{x^2}{5} + 2x^{-2}\,dx$
$= \frac{3\sqrt[3]{2}}{4} x^{4/3} - \frac{x^3}{15} - \frac{2}{x} + C$

10. $\int \frac{1}{(3x+2)^{1/4}} dx$ $= \int (3x+2)^{-1/4}\,dx = \frac{1}{3}\cdot\frac{4}{3}(3x+2)^{3/4} + C$
$= \frac{4}{9}(3x+2)^{3/4} + C$

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

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

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

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

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

14. $\int e^{3u}du.$ $= \frac{1}{3}e^{3u} + C$

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

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