

Circle your Instructor: Faudree, Williams, Zirbes

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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.

$$1. \int_1^2 6t^2 - 2t - 3 dt = 2t^3 - t^2 - 3t \Big|_1^2 = 16 - 4 - 6 - (2 - 1 - 3) = 8$$

$$2. \int \frac{9x^2 - 6x}{x^3 - x^2} dx = \int \frac{9x^2 - 6x}{u} \cdot \frac{du}{3x^2 - 2x} = \int \frac{3}{u} du = 3 \ln |u| + C$$
$$u = x^3 - x^2$$
$$du = (3x^2 - 2x) dx = 3 \ln |x^3 - x^2| + C$$

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

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

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

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

$$6. \int \frac{4}{x(\ln x)^2} dx = \int 4u^{-2} du = -\frac{4}{u} + C = \frac{-4}{\ln x} + C$$

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

DNE but...

$$7. \int_{1/2}^1 \frac{6}{\sqrt{1-x^2}} dx = 6 \arcsin(x) \Big|_{1/2}^1 = 6 \cdot \frac{\pi}{2} - 6 \cdot \frac{\pi}{6} = 2\pi$$

$$8. \int \frac{-3x}{\sqrt{1-x^2}} dx = \int \frac{3}{2} u^{-1/2} du = 3 u^{1/2} + C$$
$$u = 1-x^2$$
$$du = -2x dx$$
$$= 3 \sqrt{1-x^2} + C$$

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

$$10. \int x e^{-x^2} dx = \frac{-e^{-x^2}}{2} + C$$
$$u = -x^2$$
$$du = -2x dx$$

$$11. \int \sin x \sec^2(\cos x) dx = \int -\sec^2(u) du = -\tan(u) + C$$
$$u = \cos(x)$$
$$du = -\sin x dx$$
$$= -\tan(\cos(x)) + C$$

$$\begin{aligned} 12. \int_0^2 (5^x - 2) dx &= \frac{5^x}{\ln(5)} - 2x \Big|_0^2 = \frac{25}{\ln(5)} - 4 - \frac{1}{\ln(5)} \\ &= \frac{24}{\ln(5)} - 4 \end{aligned}$$

$$\begin{aligned} 13. \int \left(\sqrt[3]{2x} + \frac{x^2}{4} - \frac{3}{x^2} \right) dx &= \int \sqrt[3]{2} x^{1/3} + \frac{1}{4} x^2 - 3x^{-2} dx \\ &= \frac{3\sqrt[3]{2}}{4} x^{4/3} + \frac{1}{12} x^3 + \frac{3}{x} + C \end{aligned}$$

$$14. \int \frac{x^3 - 2x}{\sqrt{x}} dx = \int x^{5/2} - 2x^{1/2} dx = \frac{2}{7} x^{7/2} - \frac{4}{3} x^{3/2} + C$$

$$15. \int e^{7u} du = \frac{1}{7} e^{7u} + C$$