Ch 7.1 Wkst AP Calculus BC Name:_____

U-Substitution. No calculator allowed for these problems

For problems #1 to #9, find the integrals by *u*-substitution.

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1. $\int (\sin^3 x)(\cos x)\, dx$

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2. $\int_0^1 8x^2\, 5^{(1-x^3)}\, dx$

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3. $\int \frac{3x}{2+6x^2}\,dx$

4. $\int \frac{2\sin x}{1+\cos^2 x}\,dx$

5. $\int \frac{dx}{x(\ln x)^6}$

6. $\int_0^{\frac{1}{2}} \frac{x}{\sqrt{1-x^2}}\,dx$

7. $\int_0^{\frac{\sqrt{2}}{2}} \frac{6x}{\sqrt{1-x^4}}\,dx$

8. $\int \cot x\,dx$

9. $\int \frac{\sin\sqrt{x}}{\sqrt{x}}\,dx$

10. $\int x\sqrt{1+x}\,dx =$

11. $\int_1^5 \frac{x}{\sqrt{2x-1}}\,dx$

12. $\int \sec x\,dx$ =

Hint: multiply by $\frac{\sec x + \tan x}{\sec x + \tan x}$.

13. If $u = 3x - 1$, then $\int_1^2 \sqrt{3x-1}\,dx$ may be written as

(A) $\frac{1}{3}\int_1^2 \sqrt{u}\,du$

(B) $\frac{1}{3}\int_2^5 \sqrt{u}\,du$

(C) $\int_1^2 \sqrt{u}\,du$

(D) $\int_2^5 \sqrt{u}\,du$

(E) $-\frac{1}{3}\int_1^2 \sqrt{u}\,du$

14. Suppose $f(1) = 2e$ and $\frac{dy}{dx} = xe^{x^2}$. Find $f(0)$.

(A) $\frac{1}{2} + \frac{3}{2}e$ (B) $\frac{1}{2} - \frac{3}{2}e$ (C) $\frac{3}{2} - \frac{1}{2}e$ (D) $\frac{3}{2} + \frac{1}{2}e$ (E) $1 - \frac{1}{2}e$

15. The total area bounded by the graph of $y = x\sqrt{1-x^2}$ and the x-axis is

(A) $\frac{1}{3}$

(B) $\frac{1}{3}\sqrt{2}$

(C) $\frac{1}{2}$

(D) $\frac{2}{3}$

(E) 1

16. Let f be a function such that $\int_6^{12} f(2x)\,dx = 10$. Which of the following must be true?

(A) $\int_{12}^{24} f(t)\,dt = 5$

(B) $\int_{12}^{24} f(t)\,dt = 20$

(C) $\int_6^{12} f(t)\,dt = 5$

(D) $\int_6^{12} f(t)\,dt = 20$

(E) $\int_3^6 f(t)\,dt = 5$

ANSWERS:

1) $\frac{1}{4}\sin^4 x + C$

2) $\frac{32}{3\ln 5}$

3) $\frac{1}{4}\ln\left|2+6x^2\right| + C$

4) $-2\arctan(\cos x) + C$

5) $-\frac{1}{5}(\ln x)^{-5} + C$

6) $\frac{2-\sqrt{3}}{2}$

7) $\frac{\pi}{2}$

8) $\ln\left|\sin x\right| + C$

9) $-2\cos\sqrt{x} + C$

10) $\frac{2}{5}(1+x)^{\frac{5}{2}} - \frac{2}{3}(1+x)^{\frac{3}{2}} + C$

11) $\frac{16}{3}$

12) $\ln|\sec x + \tan x| + C$

13) B

14) A

15) D

16) B