

Name: _____

Date: _____

Period: _____ 2016

AP Calculus – Integration by U-Substitution and Separable Differential Equations

1. $\int 3x^2 dx$

2. $\int (3x+4)^3 dx$

3. $\int 2x(x^2+5) dx$

4. $\int e^x e^{e^x} dx$

5. $\int \frac{2x dx}{\sqrt{x^2-1}}$

6. $\int \frac{dx}{2x+5}$

7. $\int \frac{x^3 dx}{\sqrt{1-x^2}}$

8. $\int \cos x \sin^3 x dx$

9. $\int \cos^3 x \sin^2 x dx$

Solve the separable differential equations below with their initial value.

10. $\frac{dy}{dx} = 3x^2 - 6, f(0) = 5$

11. $\frac{dy}{dx} = y, f(3) = e$

$$12. \frac{dy}{dx} = \frac{2x}{y}, \quad f(0) = -2$$

$$13. \frac{dy}{dx} = \frac{(x+3)}{2y}, \quad f(4) = 12$$

$$14. \frac{dy}{dx} = -2xy^2, \quad f(1) = 0.25$$

$$15. \frac{dy}{dx} = \frac{4\sqrt{y} \ln x}{x}, \quad f(e) = 1$$

Solve the separable differential equations below without using an initial value.

$$16. \frac{dy}{dx} = x\sqrt{y} \cos^2 \sqrt{y}$$

$$17. \frac{dy}{dx} = e^{x-y}$$