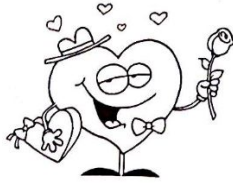


Key



WHAT DO SQUIRRELS GIVE EACH OTHER FOR VALENTINE'S DAY?

F 1. $\frac{d}{dx} e^{5x}$

M. $\frac{3(\ln x)^2}{x}$

O 2. $\frac{d}{dx} \ln x$

U. $\frac{10x}{5x^2+1}$

R 3. $\frac{d}{dx} \ln(\ln x) \quad \frac{1}{\ln x} \cdot \frac{1}{x}$

S. $-e^{2-x}$

G 4. $\frac{d}{dx} e^{x^2}$

F. $5e^{5x}$

E 5. $\frac{d}{dx} (x)(\ln x) \quad x \cdot \frac{1}{x} + \ln x$
 $1 + \ln x$

G. $2xe^{x^2}$

I 6. $\frac{d}{dx} \ln x^2 \quad \frac{1}{x^2} \cdot 2x = \frac{2}{x}$

N. $3x^2$

M 7. $\frac{d}{dx} (\ln x)^3 \quad 3(\ln x)^2 \cdot \frac{1}{x}$

E. $e^{4x}(4x+1)$

E 8. $\frac{d}{dx} x \cdot e^{4x} \quad x \cdot 4e^{4x} + e^{4x} \cdot 1$

E. $1 + \ln x$

N 9. $\frac{d}{dx} (\ln e^{x^3}) \quad \frac{d}{dx} x^3 = 3x^2$

T. $\frac{2}{x}$

U 10. $\frac{d}{dx} \ln(5x^2+1) \quad \frac{1}{5x^2+1} \cdot 10x$

R. $\frac{1}{x \ln x}$

T 11. $\frac{d}{dx} \ln\left(\frac{3x}{x+5}\right)$

T. $\frac{1}{x} - \frac{1}{x+5} \quad \frac{(x+5)-1}{x(x+5)}$

S 12. $\frac{d}{dx} (e^{2-x})$

$e^{2-x} \cdot -1$

$\frac{1}{3x} \cdot \left(\frac{(x+5)3 - 3x(1)}{(x+5)^2} \right)$

$\frac{x+5}{3x} \cdot \frac{(x+5)3 - 3x}{(x+5)^2}$

$\frac{(3x+15-3x)(x+5)}{3x(x+5)^2}$

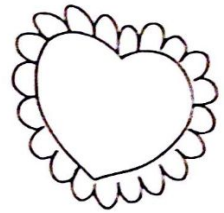
$\frac{\cancel{3(x+5)}}{3x(x+5)^2} - \frac{3x(x+5)}{3x(x+5)^2}$

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

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$\frac{1}{x} - \frac{1}{x+5}$

ON VALENTINE'S DAY, WHAT DID ONE LIGHT BULB SAY TO THE OTHER?



L 1. $\int 2e^{2x} dx$

V. $e^{x^3} + C$

O 2. $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$

E. $-\ln|\cos x| + C$

V 3. $\int 3e^{x^3} \cdot x^2 dx$

A. $\frac{1}{4}\sin(4x + 5) + C$

E 4. $\int \frac{3}{x} dx$

A. $\frac{1}{6}(x^3 + 5)^2 + C$

Y 5. $\int \frac{1}{x-7} dx$

O. $2e^{\sqrt{x}} + C$

O 6. $\int \frac{x^2-4}{x} dx$

W. $\frac{1}{4}(3x + 7)^{\frac{4}{3}} + C$

U 7. $\int \frac{(\ln x)^2}{x} dx$

E. $3 \ln|x| + C$

A 8. $\int x^2(x^3 + 5) dx$

T. $-\frac{1}{3}\ln|1 - 3x| + C$

W 9. $\int (2x - 3)^3 dx$

L. $e^{2x} + C$

H 10. $\int \sin^3 x \cos x dx$

U. $\frac{1}{3}(\ln x)^3 + C$

O 11. $\int \sec^2 x \tan x dx$

Y. $\ln|x - 7| + C$

L 12. $\int (\sin 2x) \cos 2x dx$

W. $\frac{1}{8}(2x - 3)^4 + C$

E 13. $\int \tan x dx$

O. $\frac{1}{2}x^2 - 4 \ln|x| + C$

W 14. $\int \sqrt[3]{3x + 7} dx$

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

A 15. $\int \cos(4x + 5) dx$

O. $\frac{1}{2}\tan^2 x + C$

T 16. $\int \frac{1}{1-3x} dx$

T. $2(2x^2 + 1)^{\frac{1}{2}} + C$

T 17. $\int \frac{4x}{\sqrt{2x^2+1}} dx$

L. $\frac{1}{4}(\sin 2x)^2 + C$

$$1) \int 2e^{2x} dx \quad u=2x \\ du=2dx \\ \frac{1}{2}du=dx \\ \frac{1}{2} \cdot 2 \int e^u du = \frac{1}{2} \cdot 2 e^{2x} = e^{2x} + C$$

$$3) \int e^{x^3} \cdot x^2 dx \quad u=x^3 \\ du=3x^2 dx \\ \frac{1}{3}du=x^2 dx \\ \frac{1}{3} \cdot 3 \int e^u du = e^{x^3} + C$$

$$5) \int \frac{1}{x-7} dx \quad u=x-7 \\ du=dx \\ \int \frac{1}{u} du = \ln|x-7| + C$$

$$7) \int \frac{(\ln x)^2}{x} dx \quad u=\ln x \\ du=\frac{1}{x} dx \\ \int u^2 du = \frac{u^3}{3} + C = \frac{(\ln x)^3}{3} + C$$

$$9) \int (2x-3)^3 dx \quad u=2x-3 \\ du=2dx \\ \frac{1}{2}du=dx \\ \frac{1}{2} \int u^3 du = \frac{1}{2} \cdot \frac{(2x-3)^4}{4} + C$$

$$11) \int \sec^2 x \tan x dx \quad u=\tan x \\ du=\sec^2 x dx \\ \int u du = \frac{\tan^2 x}{2} + C$$

$$2) \int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx \quad u=x^{1/2} \Rightarrow \\ du=\frac{1}{2}x^{-1/2} dx \\ 2du=\frac{1}{\sqrt{x}} dx \\ 2 \cdot \int e^u du \\ = 2e^{\sqrt{x}} + C$$

$$4) \int \frac{1}{x} dx = 3 \ln|x| + C$$

$$6) \int \left(x - \frac{4}{x}\right) dx = \frac{x^2}{2} - 4 \ln|x| + C$$

$$8) \int x^2(x^3+5) dx \quad u=x^3+5 \\ du=3x^2 dx \\ \frac{1}{3}du=x^2 dx \\ \frac{1}{3} \int u du = \frac{1}{3} \cdot \frac{(x^3+5)^2}{2} + C$$

$$10) \int \sin^3 x \cos x dx \quad u=\sin x \\ du=\cos x dx \\ \int u^3 du = \frac{\sin^4 x}{4} + C$$

$$12) \int \sin 2x \cos 2x dx \quad u=\sin(2x) \\ du=2\cos(2x) dx \\ \frac{1}{2}du=\cos(2x) dx \\ \frac{1}{2} \int u du \\ = \frac{1}{2} \left(\frac{\sin^2(2x)}{2} \right) + C$$

$$13) \int \tan x \, dx =$$

$$\int \frac{\sin x}{\cos x} \, dx \quad \begin{array}{l} u = \cos x \\ du = -\sin x \, dx \\ -du = \sin x \, dx \end{array}$$

$$-\int \frac{1}{u} \, du = -\ln|\cos x| + C$$

$$14) \int \sqrt[3]{3x+7} \, dx \quad \begin{array}{l} u = 3x+7 \\ du = 3 \, dx \\ \frac{1}{3} du = dx \end{array}$$

$$\frac{1}{3} \int u^{1/3} \, du =$$

$$\frac{1}{3} \cdot \frac{3}{4} u^{4/3} + C$$

$$\frac{1}{4} (3x+7)^{4/3} + C$$

$$15) \int \cos(4x+5) \, dx \quad \begin{array}{l} u = 4x+5 \\ du = 4 \, dx \\ \frac{1}{4} du = dx \end{array}$$

$$\frac{1}{4} \int \cos u \, du$$

$$\frac{1}{4} \sin(4x+5) + C$$

$$16) \int \frac{1}{1-3x} \, dx \quad \begin{array}{l} u = 1-3x \\ du = -3 \, dx \\ -\frac{1}{3} du = dx \end{array}$$

$$-\frac{1}{3} \int \frac{1}{u} \, du$$

$$= -\frac{1}{3} \ln|1-3x| + C$$

$$17) \int \frac{4x}{\sqrt{2x^2+1}} \, dx \quad \begin{array}{l} u = 2x^2+1 \\ du = 4x \, dx \end{array}$$

$$\int u^{-1/2} \, du = 2u^{1/2}$$

$$2(2x^2+1)^{1/2} + C$$