November 10, 2026

Marine Corps Day

Today in History:

Sesame Street debuts (1969)

Edmund Fitzgerald sinks in Lake Superior (1975)

Number of the Day: 5356

5356 = 2 x 2 x 13 x 103

5356 is the 103rd triangular number.

Fun Fact:

Law in Helena Montana states women can't dance on a table unless she has on 3 pounds, 2 oz. of clothing.

Quote of the Day:

"If everyone is thinking alike, then somebody isn't thinking."

-George S. Patton

Today's Weather:

Plentiful sunshine, high of 59^{o}.

Math 121 - Quiz #38

Find

$$\frac{d}{dx}\left[\int_2^{\sin x} \sqrt{t+\ln t}\, dt\right]$$

$= \sqrt{\sin x + \ln(\sin x)} \cdot \cos x$

SUBSTITUTION

① $\int (x+2)^2\, dx = \int (x^2+4x+4)\, dx$

$= \frac{x^3}{3} + 2x^2 + 4x + C$

② $\int (x+2)^{50}\, dx$ $\quad u = x+2$

$\frac{du}{dx} = 1 \Rightarrow du = dx$

$\int u^{50}\, du = \frac{u^{51}}{51} = \frac{(x+2)^{51}}{51} + C$

③ $\int \sqrt{x+2}\, dx$ $\quad u = x+2$, $du = dx$

$$\int \sqrt{u}\, du = \frac{2u^{\frac{3}{2}}}{3} = \frac{2}{3}(x+2)^{\frac{3}{2}} + C$$

④ $\int x\sqrt{x^2+1}\, dx$ $\quad u = x^2+1$, $du = 2x\, dx$, $dx = \frac{du}{2x}$

$$= \int x\sqrt{u}\, \frac{du}{2x} = \frac{1}{2}\int \sqrt{u}\, du$$

$$= \frac{1}{2}\cdot\frac{2}{3} u^{\frac{3}{2}} = \frac{1}{3}(x^2+1)^{\frac{3}{2}} + C$$

⑤ $\int \cos(7x+5)\, dx$ $\quad u = 7x+5$, $du = 7\, dx$, $dx = \frac{du}{7}$

$$\int \cos(u)\, \frac{du}{7} = \frac{1}{7}\int \cos(u)\, du$$

$$= \frac{1}{7}\sin(u) = \frac{1}{7}\sin(7x+5) + C$$

⑥ $\int x(x-1)^{10}\, dx$ $\quad u = x-1$, $du = dx$, $x = u+1$

$$= \int x\, u^{10}\, du$$

$$= \int (u+1)\, u^{10}\, du = \int (u^{11} + u^{10})\, du$$

$$= \frac{u^{12}}{12} + \frac{u^{11}}{11} = \frac{(x-1)^{12}}{12} + \frac{(x-1)^{11}}{11} + C$$

(7) $\int \sin^4 x \cos x \, dx$

$u = \sin x$

$du = \cos x \, dx$

$dx = \frac{du}{\cos x}$

$$= \int u^4 \cancel{\cos x} \frac{du}{\cancel{\cos x}} = \frac{u^5}{5} = \frac{\sin^5 x}{5} + C$$

(8) $\int_0^{\frac{\pi}{4}} \tan x \sec^2 x \, dx$

$u = \tan x$

$du = \sec^2 x \, dx$

$dx = \frac{du}{\sec^2 x}$

$$= \int u \cancel{\sec^2 x} \frac{du}{\cancel{\sec^2 x}} = \int u \, du$$

$$= \frac{u^2}{2} = \frac{\tan^2 x}{2} \Big|_0^{\frac{\pi}{4}} = \frac{1}{2}(1-0) = \frac{1}{2}$$

(8b) $\int_0^{\frac{\pi}{4}} \tan x \sec^2 x \, dx$

$u = \tan x$

$du = \sec^2 x \, dx$

$dx = \frac{du}{\sec^2 x}$

$x = 0 \Rightarrow u = 0$

$x = \frac{\pi}{4} \Rightarrow u = 1$

$$\int_0^1 u \cancel{\sec^2 x} \frac{du}{\cancel{\sec^2 x}}$$

$$\frac{v^2}{2}\Big|_0^1 = \frac{1}{2}$$

(9) $\int_0^1 x^2\sqrt{x^3+1}\,dx$ $\quad v = x^3+1$

$dv = 3x^2\,dx$

$dx = \frac{dv}{3x^2}$

$$= \int x^2\sqrt{v}\,\frac{dv}{3x^2} = \frac{1}{3}\,\frac{2}{3}\,v^{\frac{3}{2}}$$

$$= \frac{2}{9}(x^3+1)^{\frac{3}{2}}\Big|_0^1 = \frac{2}{9}\left(2^{\frac{3}{2}}-1\right)$$

(10) $\int \frac{1}{\sqrt{x}(\sqrt{x}+9)^2}\,dx$ $\quad v = \sqrt{x}+9$

$dv = \frac{1}{2\sqrt{x}}\,dx$

$dx = 2\sqrt{x}\,dv$

$$= \int \frac{2\sqrt{x}\,dv}{\sqrt{x}\,v^2} = \int \frac{2}{v^2}\,dv = -\frac{2}{v}$$

$$= -\frac{2}{(\sqrt{x}+9)} + C$$

(11) $\int \frac{\sqrt{\ln x}}{x}\,dx$ $\quad v = \ln x$

$dv = \frac{1}{x}\,dx$

$dx = x\,dv$

$$= \int \frac{\sqrt{u}}{x} \cdot x \, du = \int \sqrt{u} \, du$$

$$\frac{2u^{\frac{3}{2}}}{3} = \frac{2}{3}(\ln x)^{\frac{3}{2}} + C$$