

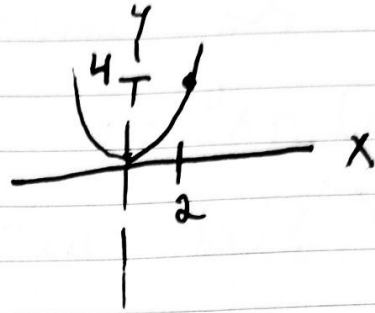


Date 1/19/2024 (M) T W T F S S

Find the limit

$$\lim_{x \rightarrow 2} x^2$$

$$= \lim_{x \rightarrow 2} (2)^2 = \boxed{4}$$



Find the limit

$$\lim_{x \rightarrow 4} x^3$$

$$= \lim_{x \rightarrow 4} (4)^3 = \boxed{64}$$



Date

1 / 20 / 2026

M T W T F S S

Find the derivative

$$f(x) = x^4$$

$$f(x) = x^4 \rightarrow$$

$$f'(x) = 4x^3$$

$$* f'(x) = nx^{n-1}$$

 $\rightarrow$

$$4x^{4-1} = 4x^3$$



Problem of the Day #3

Date 1/21/2026 MLT T F S S

Find the derivative of $y = f(x) = x \sin x$

$$f(x) = x$$

$$g(x) = \sin(x)$$

$$f'(x) = 1$$

$$g'(x) = \cos(x)$$

Product rule

$$\frac{d}{dx} [f(x)g(x)]$$

$$= f(x)g'(x) + f'(x)g(x)$$

$$f'(x) = y' = x \cos(x) + (1) \sin x$$

$$= x \cos(x) + \sin x$$



Find the derivative of $f(x) = e^x$

$$f(x) = e^x$$

$$f'(x) = \underline{e^x}$$

Find the derivative of $f(x) = \ln x$

$$f(x) = \ln x$$

$$f'(x) = \underline{\frac{1}{x}}$$

Problem of the Day 5



Date 1/23/2026

Find the derivative of $f(x) = \ln(2x)$

$$f'(x) = \frac{1}{2x} \cdot 2$$

$$= \boxed{\frac{1}{x}}$$

$$\frac{d}{dx} [\ln(f(x))]$$

$$= \frac{1}{f(x)} f'(x)$$

Find the derivative of $f(x) = \ln(\sin(x))$

$$f'(x) = \frac{1}{\sin(x)} \cdot \cos(x) = \frac{\cos(x)}{\sin(x)} = \boxed{\cot x}$$



Problem of the Day 6

Date 1 / 24 / 2026

Find the derivative of $\tan x$

$$f(x) = \tan x \rightarrow f'(x) = \sec^2(x)$$

Find the derivative of $\sin x$ four times

$$f(x) = \sin x$$

$$f'(x) = \cos x$$

$$f''(x) = -\sin(x)$$

$$f'''(x) = -\cos(x)$$

$$f^{(4)}(x) = \sin x$$



Date 1/25/2026

Problem of the Day 7

Find the Derivative of $f(x) = \frac{x^4}{1+x} = y$

Use the quotient rule:

$$\left(\frac{f(x)}{g(x)}\right)' = \frac{g(x)f'(x) - f(x)g'(x)}{(g(x))^2}$$

$$y = \frac{x^4}{1+x}$$

$$\left. \begin{array}{l} f(x) = x^4 \\ g(x) = 1+x \\ f'(x) = 4x^3 \\ g'(x) = 1 \end{array} \right\} \rightarrow \frac{(1+x)(4x^3) - (x^4)(1)}{(1+x)^2}$$

Bottom

$$\rightarrow (1+x)(1+x) \rightarrow (1)(x) + x(1) + 1 + x^2$$

$$\rightarrow x^2 + 2x + 1$$

Top

$$4x^3 + 4x^4 - x^4$$

$$4x^3 + 3x^4$$

$$y' = \frac{4x^3 + 3x^4}{x^2 + 2x + 1} \quad \text{or} \quad \frac{4x^3 + 3x^4}{(1+x)^2}$$



Date 1, 26, 2026 M T W T F S S

Problem of the Day 8

Find the derivative of $\frac{d}{dx} = \frac{\sin x}{x^2} = y$ Use Quotient Rule: $\frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$

$$f(x) = \sin(x)$$

$$g(x) = x^2$$

$$f'(x) = \cos(x)$$

$$g'(x) = 2x$$

$$y' = \frac{(x^2)\cos x - \sin x(2x)}{(x^2)^2}$$

$$y' = \frac{x^2 \cos x - 2x \sin x}{x^4}$$

$x^{2 \cdot 2}$



Date 1 / 27 / 2026

M T W T F S S

Problem of the Day 9

~~the (sin(2x))~~

Find the Derivative of $f(x)$

$$f(x) = \ln(\sin(2x))$$

apply chain
rule

$$f'(x) = \frac{1}{\sin(2x)} \cdot \cos(2x) \cdot 2$$

$$f'(x) = \frac{2\cos(2x)}{\sin(2x)} = 2\cot(2x)$$

Chain Rule

$$\frac{d}{dx} [(f(x))^n] = n(f(x))^{n-1} \cdot f'(x)$$



Date 1/28/2026

M T W T F S S

Problem of the Day 10

Find the Integral:

$$\int x^2 dx \rightarrow \boxed{\frac{x^3}{3} + C}$$

$$\frac{x^{n+1}}{n+1}$$

 $\hookrightarrow$ Integral of polynomial



Date 1/29/2026 M T W T F S S

Problem of the Day 11

Multiplying Exponents

$$y = x^4 \cdot x^5$$

$$y = x^{4+5} = \boxed{x^9}$$

$$y = x^{1/2} \cdot x^{3/2} = x^{1/2 + 3/2} = \boxed{x^2}$$

$$y = x^{1/3} \cdot x^{1/2} = x^{1/3 + 1/2}$$

$$\rightarrow \frac{1}{3} + \frac{1}{2} \quad \underline{\text{CD}}$$

$$= \frac{1}{3} \cdot \frac{2}{2} + \frac{1}{2} \cdot \frac{(3)}{(3)} = \frac{2}{6} + \frac{3}{6} = \frac{5}{6}$$

$$\boxed{y = x^{5/6}}$$



Date 1/30/2020

M T W T F S S

Problem of the Day 12

Dividing Exponents

$$y = \frac{x^4}{x^5} = x^{4-5} = x^{-1} = \boxed{\frac{1}{x}}$$

$$y = \frac{x^{1/2}}{x^{1/3}} = x^{1/2 - 1/3}$$

CD

$$\rightarrow \frac{1}{2} - \frac{1}{3} \Rightarrow \frac{1}{2} \frac{(3)}{(3)} - \frac{1}{3} \frac{(2)}{(2)}$$

$$\rightarrow \frac{3}{6} - \frac{2}{6} = \frac{1}{6}$$

$$\boxed{y = x^{1/6}}$$



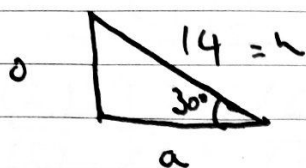
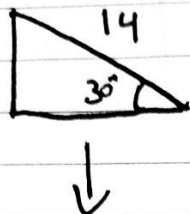
Date 1 / 31 / 2022

M T W T F S S

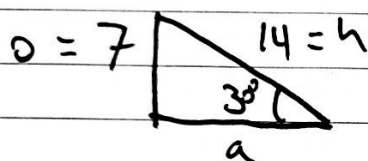
Problem of the Day 13

Solve for all sides of the Triangle

SOH CAH TOA



$$\begin{aligned} \sin(30^\circ) &= \frac{a}{14} \\ a &= 14 \sin(30^\circ) = \boxed{7} \end{aligned}$$



$$\begin{aligned} \cos(30^\circ) &= \frac{a}{14} \\ a &= 14 \cos(30^\circ) = \boxed{12.1} \end{aligned}$$

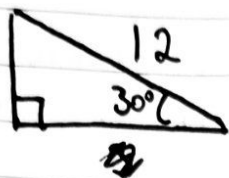
Check

$$\rightarrow \sqrt{7^2 + 12.1^2} = \sqrt{196} = \boxed{14} \quad \checkmark$$



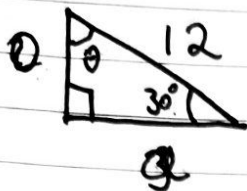
Date 2 / 1 / 2026 M T W T F S S

Problem of the Day 14



Find the missing angle
+ the missing sides

Soh Cah Toa



$$\sin(30^\circ) = \frac{a}{12}$$

$$12 \sin(30^\circ) = a$$

$$\cos(30^\circ) = \frac{12}{a}$$

$$12 \cos(30^\circ) = \frac{12}{a}$$

$$\theta = ? \rightarrow 180 - 90 - 30 = \boxed{60^\circ = \theta}$$

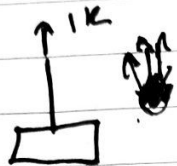
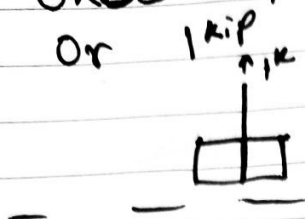


Date 2/2/2026 M T W T F S S

Problem of the Day 15

Find the stress on the cable
once the crane picks up a 1000 lb
or 1 kip object

The cable is 1 inch
dia

 $\pi r^2 = \text{Area}$

$$\sigma = \frac{P}{A} = \frac{1000 \text{ lbs}}{\pi (0.5)^2 \text{ in}^2}$$

$$\sigma = 1,273 \text{ PSI}$$



Date 2/3/2026 M T W T F S S

Problem of the Day 16

Find the Integral:

$$\int \frac{1}{x} dx$$

$$\int \frac{1}{x} dx = \boxed{\ln x + C}$$

$$\frac{2x + 1}{2}$$



Date 2 / 4 / 2026 M T W T F S S

Problem of the Day 17

$$\int 5x \cos(4x^2) dx \quad \left[\text{Find the Integral} \right]$$

$$= \int 5x \cos(4x^2) dx$$

$$u = 4x^2$$

$$\frac{du}{dx} = 8x$$

Solve for dx

$$= \int 5x \cos(u) dx$$

$$= \int 5x \cos(u) \frac{du}{8x}$$

$$\frac{du}{8x} = dx$$

$$= \frac{5}{8} \int \cos(u) du$$

$$= \frac{5}{8} \sin(u) + C$$

$$= \frac{5}{8} \sin(4x^2) + C$$

U-Sub



Date 25/2026

M T W T F S S

Problem of the Day 18

Find the Integral

$$\int x^2 e^{x^3} dx$$

$$= \int x^2 e^{x^3} dx$$

U-Sub

$$U = x^3$$

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

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

$$= \int x^2 e^u dx$$

$$= \int \cancel{x^2} e^u \frac{du}{\cancel{3x^2}}$$

$$\frac{1}{3} \int e^u du = \frac{1}{3} e^u + C = \boxed{\frac{1}{3} e^{x^3} + C}$$



Date 2/6/2026 M T W T F S S

Problem of the Day 19

A engine takes 4.2 quarts of oil
how many oz is 0.2 of a quart
+ how many oz total does the
engine take?

$$1 \text{ quart} = 32 \text{ oz}$$

$$0.2 \cdot 32 \text{ oz} = \boxed{6.4 \text{ oz}}$$

$$4.2 \cdot 32 \text{ oz} = \boxed{134.4 \text{ oz}}$$



Date 2/7/2026

M T W T F S S

Problem of the Day 20

Unit conversions

you skip a rock on the water
+ it goes 5000 ft/hour how many
mph is that?

$$\frac{5,000 \text{ ft}}{\text{hour}} \times \frac{1 \text{ mile}}{5,280} = \boxed{0.947 \text{ mph}}$$

now you skip a rock on the water
+ it goes 800 ft/sec how fast is
that in miles per hour.

$$\frac{800 \text{ ft}}{\text{Sec}} \times \frac{1 \text{ mile}}{5,280 \text{ ft}} \times \frac{60 \text{ Sec}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hour}} = \boxed{545.5 \text{ mph}}$$

$$\frac{800 \cdot 60 \cdot 60}{5,280}$$

$$= \boxed{545.5 \text{ mph}}$$



Problem of the Day 21

Date 2/8/2020

M T W T F S S

A Hammer falls @ the speed of gravity
with a mass of 5 slugs what is the force.

$$a = 32.2 \text{ ft/s}^2$$

$$m = 5 \text{ slugs}$$

$$F = ma$$

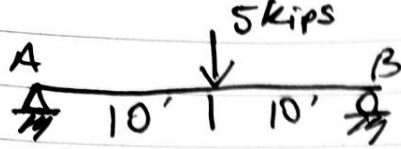
$$F = 5 \cdot 32.2 = \boxed{161 \text{ lbs}}$$



Problem of the Day²² Date 2/9/2026

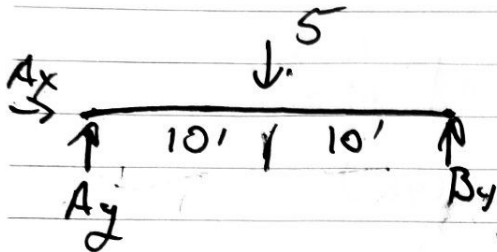
M T W T F S S

Find the reaction forces in the beam.



EoF E

$\sum F_x, \sum F_y, \sum M$



$$\uparrow \sum M_A = 0 = -(5^k)(10') + B_y(20)$$

$$50 = B_y(20)$$

$$\uparrow B_y = 2.5^k \text{ kips}$$

$$\uparrow \sum F_y = 0 = A_y - 5^k + 2.5^k$$

$$\uparrow A_y = 2.5^k \text{ kips}$$

$$\underline{\sum F_x = 0}$$

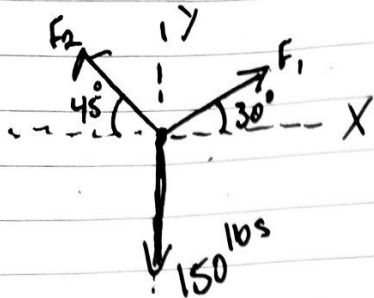


Problem of the Day 23

Date 2/10/2020

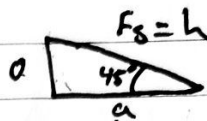
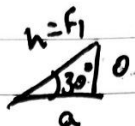
M T W T F S S

Find the forces in the system



1) $\sum F_x + \sum F_y$

solution for



$$\rightarrow \sum F_x = 0 = F_1 \cos(30^\circ) - F_2 \cos(45^\circ)$$

$$F_1 0.866 - F_2 0.707$$

$$F_2 = F_1 (1.22)$$

$$\uparrow \sum F_y = 0 = -150 + F_2 \sin(45^\circ) + F_1 \sin(30^\circ)$$

$$150 = F_2 0.707 + F_1 (0.5)$$

$$150 = F_1 (0.866) + F_1 (0.5)$$

$$150 = F_1 (1.366)$$

$$110^{lb} = F_1$$

$$F_1 = 110^{lb}$$

$$F_2 = 110 (1.22) = 134^{lb}$$

$$0 = F_1 0.866 - F_2 0.707$$

$$F_2 0.707 = F_1 0.866$$

$$F_2 = \frac{F_1 0.866}{0.707}$$

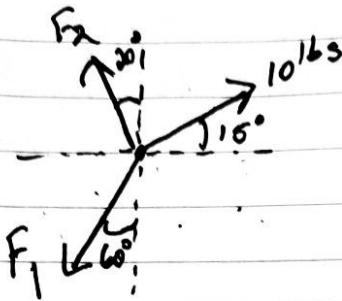
$$F_2 = F_1 (1.22)$$



Date 2/11/2026 M T W T F S S

Problem of the day 24

Find the forces in the system:



$$\rightarrow \sum F_x = 0 = 10 \cos(15^\circ) - F_2 \sin(20^\circ) - F_1 \sin(60^\circ)$$

$$9.65 = F_2 (0.34) + F_1 (0.866)$$

$$\frac{9.65 - F_1 (0.866)}{0.34} = F_2$$

$$\underline{28.38 - F_1 (2.547) = F_2} \quad (\text{Eq 1})$$

$$\uparrow \sum F_y = 0 = 10 \sin(15^\circ) + F_2 \cos(20^\circ) - F_1 \cos(60^\circ)$$

$$F_1 (0.5) = 2.588 + F_2 (0.9397)$$

$$F_1 (0.5) = 2.588 + \left(\frac{9.65 - F_1 (0.866)}{0.34} \right) (0.9397)$$

$$F_1 (0.5) = 2.588 + (28.38 - F_1 (2.547)) (0.9397)$$

$$F_1 (0.5) = 2.588 + 26.67 - F_1 (2.39)$$

$$F_1 (0.5) + F_1 (2.39) = 29.258$$

$$F_1 (2.89) = 29.258$$

$$\boxed{F_1 = 10.12 \text{ lbs}}$$

$$28.38 - F_1 (2.547) = F_2 = 2.59 \text{ lbs}$$



Date 2/12/2026

M T W T F S S

Problem of the Day 25

Volumetric flow rate:

You have a river with a net cross-sectional Area = 500 ft^2 that is moving 5 mph what is the flow rate in ft^3/sec

$$Q = VA$$

 $A = \text{Area}$ $V = \text{velocity of flow}$ $Q = \text{volumetric flow rate}$

$$\frac{5 \text{ miles}}{\text{hours}} \cdot \frac{1 \text{ hour}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} = 7.33 \frac{\text{ft}}{\text{sec}}$$

$$Q = 500 \text{ ft}^2 \cdot 7.33 \frac{\text{ft}}{\text{sec}} = \boxed{3665 \frac{\text{ft}^3}{\text{sec}}}$$



Date 2/13/2026

M T W T F S S

Problem of the Day 26.Find the derivative of $\cot x$

$$f(x) = \cot x$$

$$(f'(x) = -\csc^2 x)$$



Date 2/14/2026

M T W T F S S

Problem of the Day 27
Find the derivative.

$$f(x) = 4x^2 + 3x^3 + 5x^4 + 2$$

$$f'(x) = 4 \cdot 2x^{2-1} + 3 \cdot 3x^{3-1} + 5 \cdot 4x^{4-1}$$

$$f'(x) = 8x + 9x^2 + 20x^3$$



Date 2/15/2026

M T W T F S S

Problem of the Day 28

The Chain Rule:

$$f(x) = \ln(x^2 + 4)$$

$$f'(x) = \frac{1}{x^2 + 4} (2x) = \boxed{\frac{2x}{x^2 + 4}}$$

$$f(x) = \sin(2x + 1)$$

$$f'(x) = \cos(2x + 1) \cdot 2 = \boxed{2\cos(2x + 1)}$$



Date 2/16/2026 M T W T F S S

Problem of the Day 29

You have \$10,000 + you invest it @ 7% interest annually. How much will you have in 20 years?

$$A = P(1 + r/n)^{nt}$$

t = time in years = 20

n = # of times interest is compounded per year = 1

r = interest rate = 7% $\rightarrow$ 0.07

P = principal = \$10,000

A = Amount = what we are finding.

$$A = \$10,000 \left(1 + \frac{0.07}{1} \right)^{(1)(20)}$$

$$= 10,000 (1.07)^{20}$$

$$= 10,000 (3.869)$$

$$= \$38,696.84$$



Date 2/17/2026 M T W T F S S

Problem of the Day 30
you have \$150,000 + you invest it
@ 7% interest annually. How much will
you have in 20 years?

$$A = P(1 + r/n)^{nt}$$

t = time in years = 20

n = # of times interest compounded per year = 1

r = Interest rate = 7% $\Rightarrow$ 0.07

P = \$150,000 = Principal

A = Amount = what we are finding.

$$A = 150,000 \left(1 + \frac{0.07}{1}\right)^{(1)(20)}$$

$$A = 150,000 (1.07)^{20}$$

$$A = 1580,452.67$$

The principal has a large affect on the amount of money you have in 20 years.

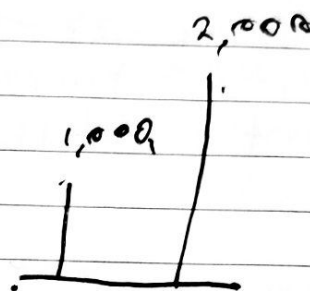
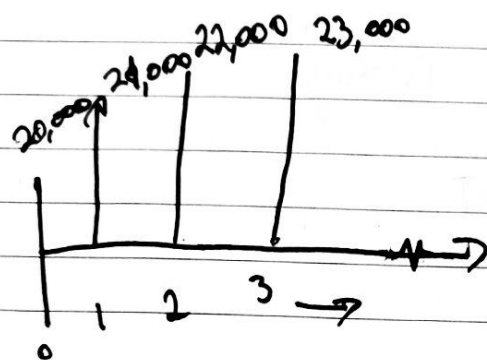
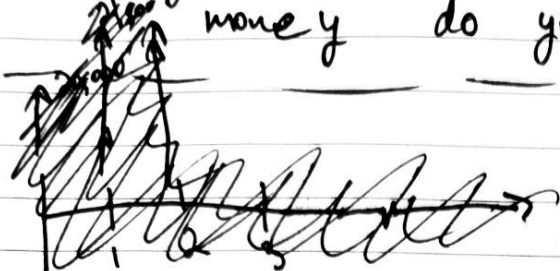


Date 2/18/2026

M T W T F S S

Problem of the day 31

You Deposit \$1,000 a year for 20 years @ 7% return yearly also you started with \$20,000. how much money do you have in 20 years.



$$F_1 = P(1+i)^n = 20,000(1.07)^{20} = \$77,393.69$$

$$F_2 = A \left(\frac{(1+i)^n - 1}{i} \right) = 1,000 \left(\frac{(1.07)^{20} - 1}{0.07} \right) = \$40,995.50$$

$$\text{Total} = F_1 + F_2 = 77,393.69 + 40,995.50$$

$$\text{Total} = \$118,389.18$$



Date 2, 19, 2026 M T W T F S S

Problem of the Day 32

you want \$1,000,000 in 20 years
but you will only get a 5% return
in your C.D. How much money do you need
@ the start of the 20 years to have
1,000,000 @ the end of the 20 years?

$$F = P(1+i)^N$$

$$F = 1,000,000$$

$$P = ?$$

$$i = 0.05$$

$$N = 20$$

$$1,000,000 = P(1.05)^{20}$$

$$1,000,000 = P(2.653)$$

$$P = \$376,889.43$$



Date 2, 20, 2026

M T W T F S S

Problem of the day 33Solving Equations for x

1) $4 = 5x + 2$

PEMDAS.

$$4 - 2 = 5x$$

$$2 = 5x$$

$$\boxed{\frac{2}{5} = x}$$

$$2 = \sqrt{x} + 1$$

$$2 - 1 = \sqrt{x}$$

$$1 = \sqrt{x}$$

$$1^2 = (\sqrt{x})^2$$

$$\boxed{1 = x}$$

$$4 = \sqrt{x+2} + 4 - 5$$

$$4 + 5 - 4 = \sqrt{x+2}$$

$$5 = \sqrt{x+2}$$

$$(5)^2 = (\sqrt{x+2})^2$$

$$25 = x + 2$$

$$\boxed{23 = x}$$



Date 2/21/2026 M T W T F S S

Problem of the Day 34.

Factoring!

1) $x^4 + x^5$



$$\boxed{x^4(1+x)}$$

2) $x^3 + 2x^2 - 1$

Break apart

$$x^3 + x^2 + x^2 - 1$$

add in $x - x$

$$x^3 + x^2 + x^2 + x - x - 1$$

Factor out a x^2

$$x^2(x+1) + x^2 + x - x - 1$$

Factor out a x

$$x^2(x+1) + x(x+1) - x - 1$$

factor out a $-$

$$x^2(x+1) + x(x+1) - (x+1)$$

factor out a $x+1$

$$\boxed{(x+1)(x^2 + x - 1)}$$



Date 2/22/2026

M T W T F S S

Problem of the Day 35.

Foil The problem.

1) $(1+x)(1+x)$

$\rightarrow (1+x)(1+x)$

$$1 + x + x + x^2$$

$$\boxed{x^2 + 2x + 1}$$

2)

$(2x+1)(x^2+x)$

$$2x^3 + 2x^2 + x^2 + x$$

$$\boxed{2x^3 + 3x^2 + x}$$