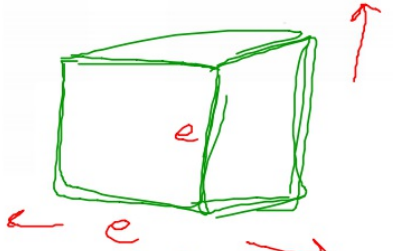
Good afternoon: warm up in notebooks please

The volume of a cube is increasing at the rate of 20 cm³/sec. How fast, in square cm per second, is the surface area of the cube increasing at the instant when each edge is 10 cm long?

D



R

$\frac{dV}{dt} = 20$

$\frac{dS}{dt} = ?$

$e = 10$

E $S = 6e^2$

D $\frac{d}{dt}\left[S = 6e^2\right]\frac{d}{dt}$

$\frac{dS}{dt} = 12e \cdot \frac{de}{dt}$

?

✓

!

$\frac{dV}{dt} = 20$

$V = e^3$

$\frac{dV}{dt} = 3e^2 \frac{de}{dt}$

$20 = 3e^2 \cdot \frac{de}{dt}$

$\frac{20}{3e^2} = \frac{de}{dt}$

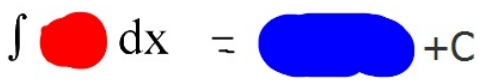
$\frac{dS}{dt} = 12e\frac{20}{3e^2}$

$12 \cdot 10 \cdot \frac{20}{3 \cdot 10^2}$

8

Homework solution

Are not needed! Just take the derivative of your answer and see if you
what the book had as theintegrand.



Assessment
show all work
turn into basket when finished

Then try these in notes:

① $\int \frac{5}{x}\,dx$

② $\int e^{3x}\,dx = \frac{1}{3}e^{3x} + C$

$\int e^{x}\,dx = e^{x} + C$

Check:

$\frac{1}{3}\cdot\frac{1}{dx}e^{3x}$

$\frac{1}{3}e^{3x}\cdot 3$

e^{3x} ✓

$\int x^{n}\,dx = \frac{x^{n+1}}{n+1} + C$

$\int 5\cdot\frac{1}{x}\,dx = 5\ln x + C$

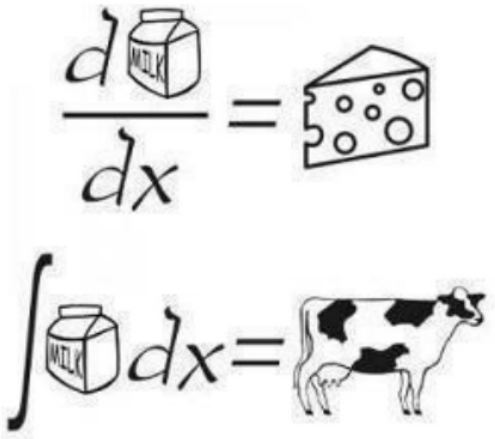
deriv

$$\frac{d}{dx}\left(\text{MILK}\right) = \text{CHEESE}$$

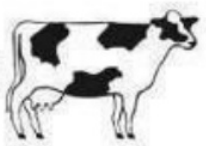
$$\int \left(\text{MILK}\right) dx = \text{COW}$$

$$\lim_{x \to 8^+} \frac{1}{x-8} = \infty$$

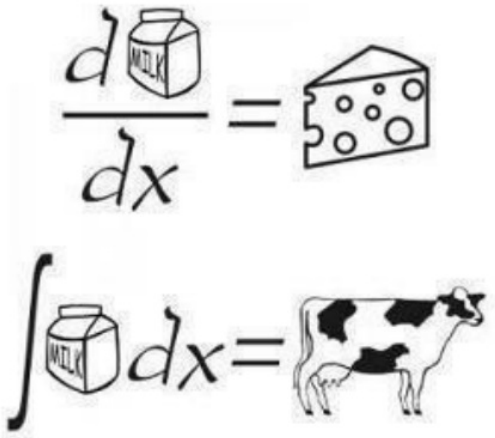
$$\lim_{x \to 5^+} \frac{1}{x-5} = \sqcap$$



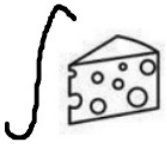
What is

$\frac{d}{dx}$ 

answer on white boarc



What is

$\int$  dx ?

answer on white boarc

Do in your head and vote with white board

What is dy/dx?

$$y = (-4x^5 - 5)^2$$

A) $\frac{dy}{dx} = (-4x^5 - 5) \cdot -20x^4$

B) $\frac{dy}{dx} = -40x^4(-4x^5 - 5)$

E. wat

C) $\frac{dy}{dx} = 2(-4x^5 - 5)$

D) $\frac{dy}{dx} = -20x^4$

What is dy/dx?

$$y = (4x^3 + 5)^5$$

A) $\frac{dy}{dx} = 5(4x^3 + 5)^4$

B) $\frac{dy}{dx} = (4x^3 + 5)^4 \cdot 12x^2$

C) $\frac{dy}{dx} = 12x^2$

D) $\frac{dy}{dx} = 60x^2(4x^3 + 5)^4$

Return whiteboards and pens please
Notes next :)

NOTES:
When you do the chain rule, what does the answer look like?

$$\frac{d}{dx}\left(\text{math stuff}\right)^{100} = 100\left(\text{math stuff}\right)^{99}\cdot\frac{d}{dx}\left(\text{math stuff}\right)$$

$$\int \frac{d}{dx}\left(\text{math stuff}\right)\left(\text{math stuff}\right)^{n}\cdot dx = \frac{\left(\text{math stuff}\right)^{n+1}}{n+1} + \text{t}$$

ex/ $\frac{1}{2}\int 2x\,(x^2+1)^5\,dx$

$u = x^2+1$

$\frac{1}{2}\cdot\frac{(x^2+1)^6}{6}+C$

$\boxed{\frac{1}{12}(x^2+1)^6+C}$

ex/ $\int 3x^2\sqrt{2x^3-4}\cdot dx$

$\int 3x^2(2x^3-4)^{1/2}\cdot dx$

Rewrite

Ask... is the derivative of the inside sitting next to it?

$2x^3-4 \rightarrow 6x^2 \leftarrow$ Need this!!

$\frac{1}{2}\int 2\cdot 3x^2(2x^3-4)^{1/2}\cdot dx$

Oh, Cheating!! Now it's ok.

$\frac{1}{2}\int 6x^2(2x^3-4)^{1/2}\,dx$

Yay, deriv. of inside is now sitting next to it.

$\int (\text{censored})(2x^3-4)^{1/2}+C$

censored reverse power rule

$\frac{1}{2}\left[\frac{(2x^3-4)^{3/2}}{3/2}+C\right]$

$\frac{1}{2}\left[\frac{2}{3}(2x^3-4)^{3/2}+C\right]$

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

Since C is an arbitrary constant, $\frac{C}{2}$ is just -- another constant.

ex/ $\int 3x^2\sqrt{2x^3-4}\cdot dx$

$\int 3x^2(2x^3-4)^{1/2}\cdot dx$

Rewrite

Ask... is the derivative of the inside sitting next to it?

$2x^3-4 \longrightarrow 6x^2$ ← Need this!!

$\frac{1}{2}\int 2\cdot 3x^2(2x^3-4)^{1/2}\cdot dx$

Ok, now it's ok. ← Cheating!!

$\frac{1}{2}\int 6x^2(2x^3-4)^{1/2}\,dx$

Yay, deriv. of inside is now sitting next to it.

$\int (2x^3-4)^{1/2}+C$

censored

reverse power rule

$\frac{1}{2}\left[\frac{(2x^3-4)^{3/2}}{3/2}+C\right]$

$\frac{1}{2}\left[\frac{2}{3}(2x^3-4)^{3/2}+C\right]$

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

Since C is an arbitrary constant, $\frac{C}{2}$ is just -- another constant.

HW

p 301 ~~#7-26~~ #7-13

don't have to check solutions by taking derivative if you don't waaaant to calcchat to help :)