Calculus: The study of change!

MV Calculus: the study of change in Multiple dimensions.

What is changing? Functions in multiple dimensions.

f(x,y) ....Area(length,width) = l*W

domain, range, etc.

1. award: 10.00 points Problems? Adjust credit for all students.

Select the domain of the given function.

$$f(x, y) = \frac{17x}{y - x^2}$$

A. Domain = $\{(x, y) | y \neq x^2\}$
B. Domain = $\{(x, y) | y \neq 2x\}$
C. Domain = $\{(x, y) | y > x^2\}$
D. Domain = $\{(x, y) | y \neq x\}$

$y - x^2 \neq 0$

$y \neq x^2$

2. award: 10.00 points Problems? Adjust credit for all students.

1 out of 3 attempts

Select the domain of the given function.

$$f(x, y, z) = \frac{5xy}{\sqrt{15 - x^2 - y^2 - z^2}}$$

(15, 0, 0) gives "0" in denom.

- A. Domain = $\{(x, y, z) | x^2 + y^2 + z^2 \leq 15\}$
- B. Domain = $\{(x, y, z) | x^2 + y^2 + z^2 > 15\}$
- C. Domain = $\{(x, y, z) | x^2 + y^2 + z^2 \geq 15\}$
- D. Domain = $\{(x, y, z) | x^2 + y^2 + z^2 < 15\}$

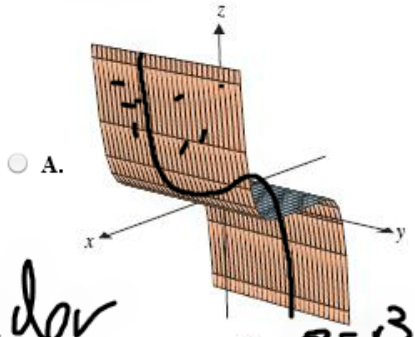
$15 - x^2 - y^2 - z^2 \geq 0$

$15 \geq x^2 + y^2 + z^2$

4. award: 10.00 points Problems? Adjust credit for all students.

1 out of 3 attem

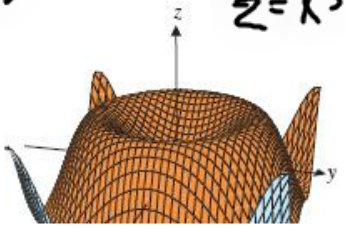
2 Match $f(x, y) = x^2 + 3x^3$ to the surface.



A.

Cylinder

$z = x^3$



B.

references

Graph = collection of points

Makes $z = x^3$ True

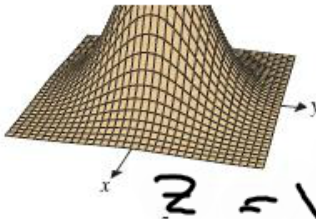
(1, 0, 1)

(1, 2, 1)

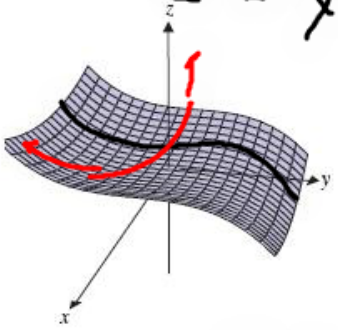
(1, 3, 1)

1 out of 3 attemp

B.



$z = y^3$



C.

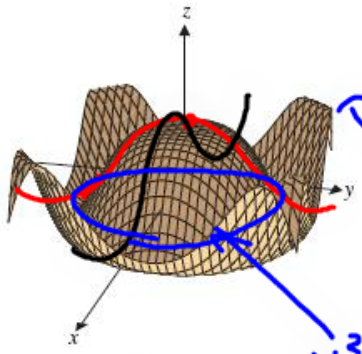
$z = x^2$

$z = x^2 - y^3$

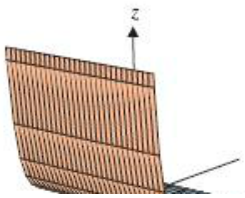
1 out of 3 attempts

Match $f(x, y) = 3\ \cos(x^2 + y^2)$ to the surface.

A.

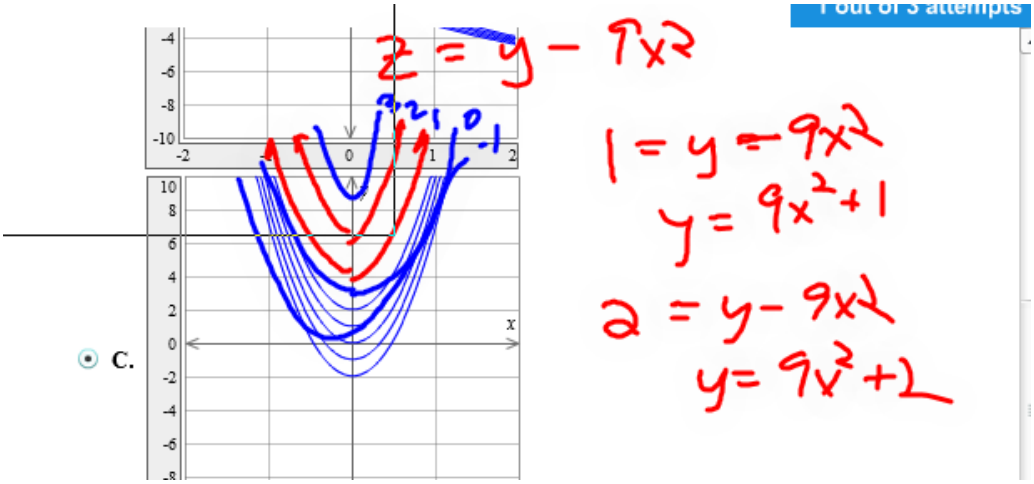


B.



$x^2+y^2=\pi$

$\cos(x^2+y^2)=\cos\pi=-1$



C.

points

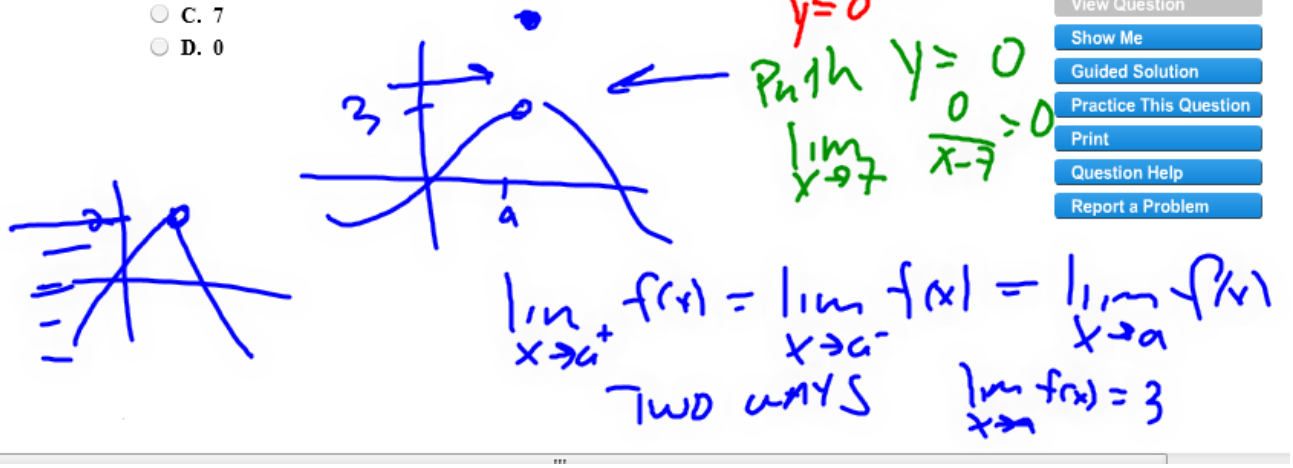
1 out of 3 attempts

Evaluate $\lim_{(x,y)\to(7,0)} \frac{y}{x+y-7}$.

- A. Limit does not exist.
- B. 13
- C. 7
- D. 0

Assistance

- NetCalculator
- Check My Work
- View Hint
- View Question
- Show Me
- Guided Solution
- Practice This Question
- Print
- Question Help
- Report a Problem



True or false?

$f(x, y) = 9e^{x^4 y}$ is continuous.

Notice that $f(x, y) = g(h(x, y))$, where $g(t) = 9e^t$ and $h(x, y) = x^4 y$. Since g is continuous for all values of t and h is a polynomial in x and y (and hence continuous for all x and y), it follows that f is continuous for all x and y.

Thus, the statement is true.

Continuity:

Lim Exist

Function Exist

Lim = Function

prev | Question #11 (of 16) | next

11. award: 10.00 points

Problems? Adjust credit for all students.

1 out of 3 attempts

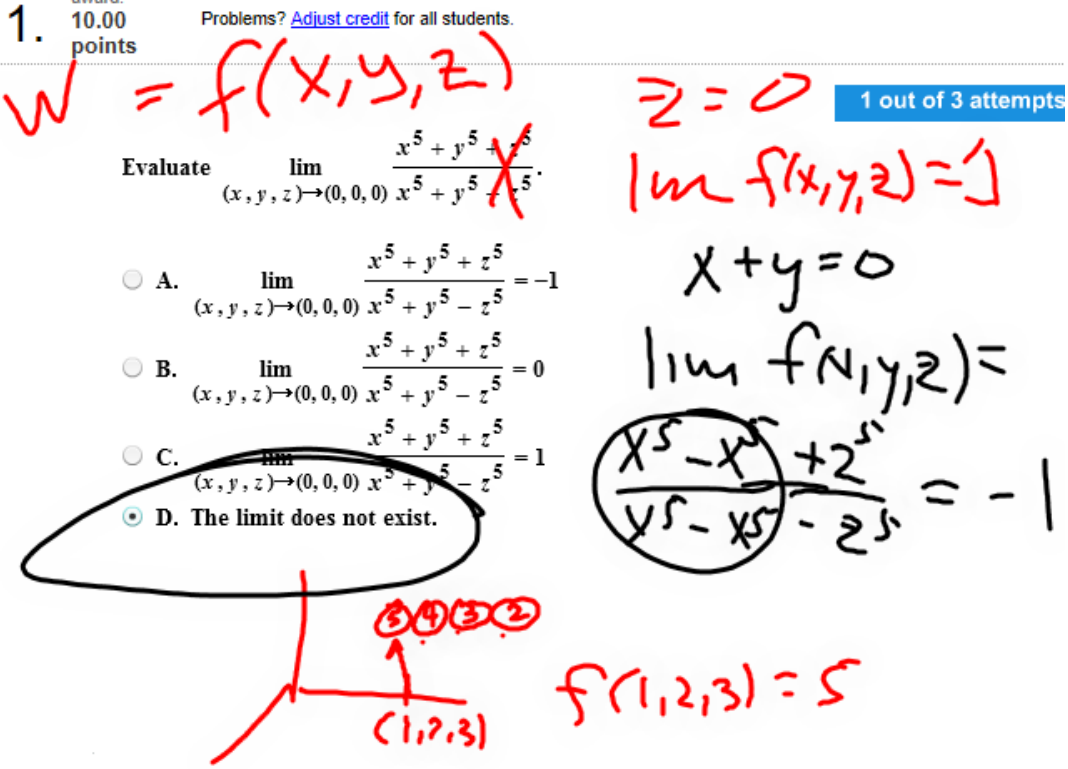
Evaluate $\lim_{(x,y,z)\to(0,0,0)} \frac{x^5+y^5+z^5}{x^5+y^5-z^5}$.

A. $\lim_{(x,y,z)\to(0,0,0)} \frac{x^5+y^5+z^5}{x^5+y^5-z^5} = -1$

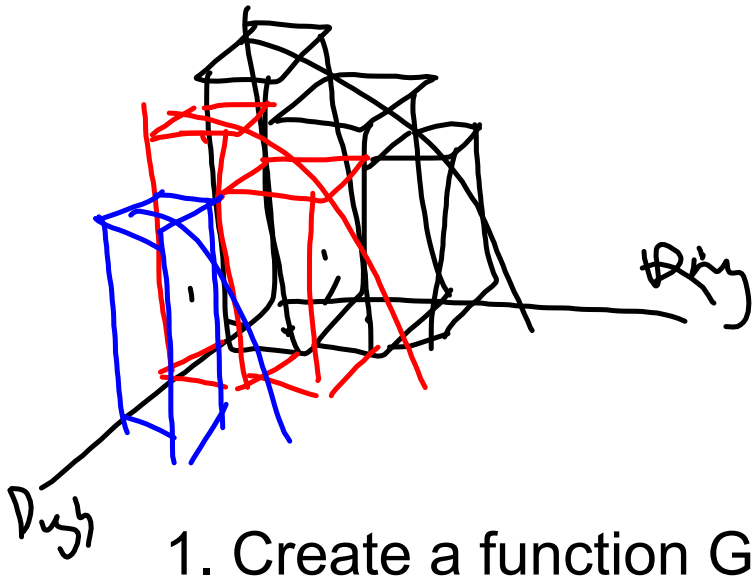
B. $\lim_{(x,y,z)\to(0,0,0)} \frac{x^5+y^5+z^5}{x^5+y^5-z^5} = 0$

C. $\lim_{(x,y,z)\to(0,0,0)} \frac{x^5+y^5+z^5}{x^5+y^5-z^5} = 1$

D. The limit does not exist.

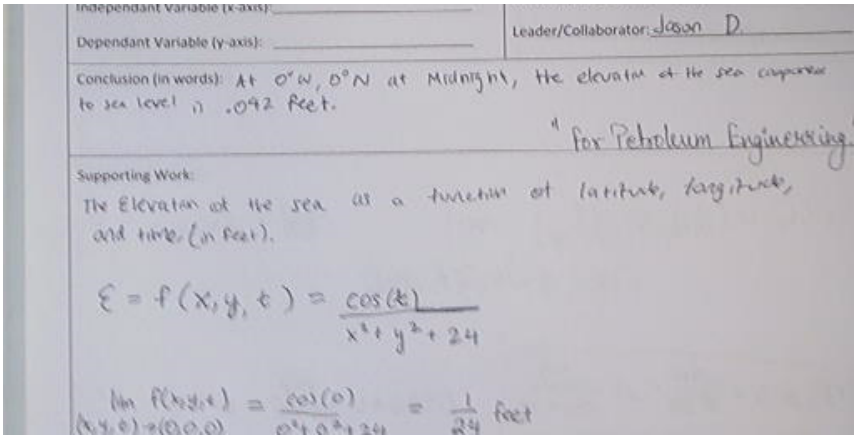


Create a multivariable function!



x	y	z
1	1	6
2	1	5
1	2	5
2	2	4

1. Create a function G=F+P+M
2. Write a limit $\lim_{(F,P,M)\to(\tilde{F},0,0)} G = \tilde{F}+0+0=\tilde{F}$
3. Write in words As P & M go to zero, and F goes to $\tilde{F}$ Grade becomes $\tilde{F}$



Independant Variable (x-axis): _____

Dependant Variable (y-axis): _____

Leader/Collaborator: Jason D.

Conclusion (in words): At 0°W, 0°N at Midnight, the elevation of the sea compared to sea level is .042 feet.

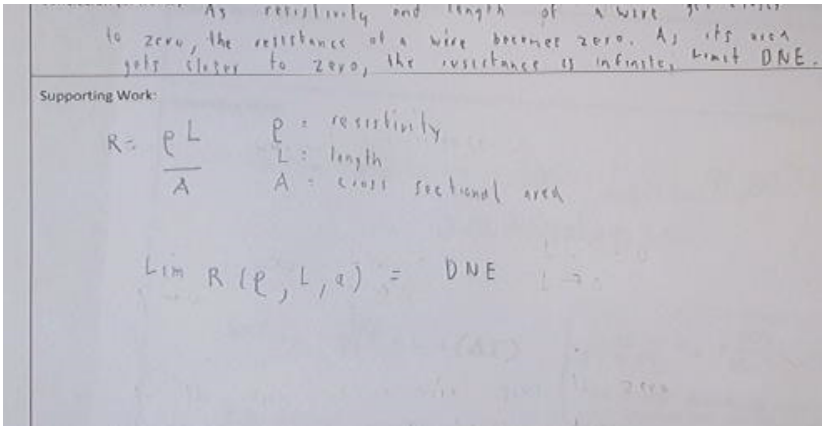
* for Petroleum Engineering

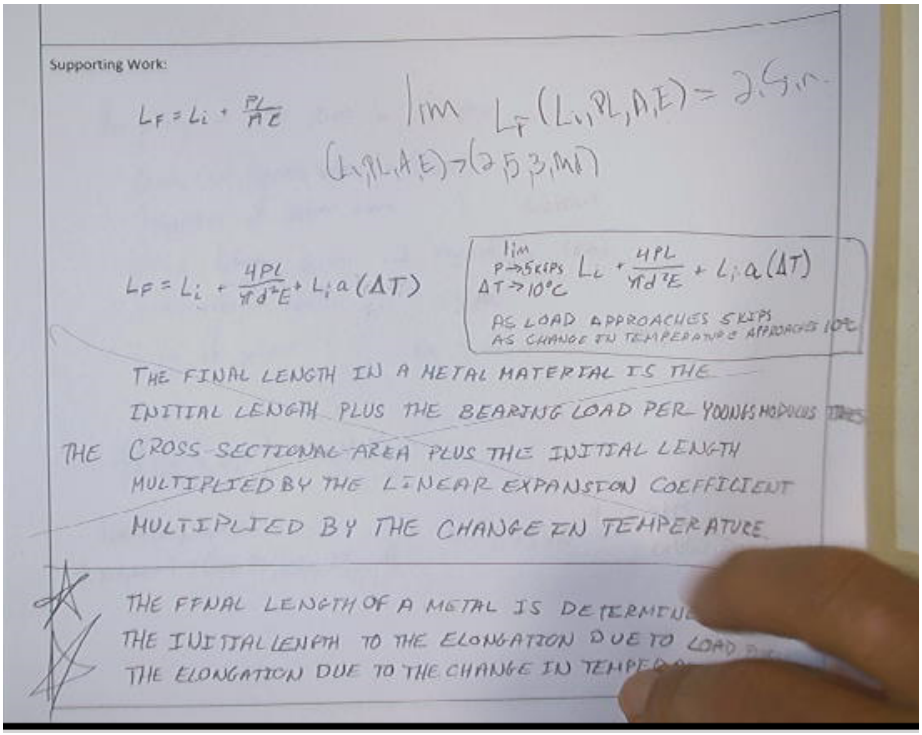
Supporting Work:

The Elevation of the sea as a function of latitude, longitude, and time. (in feet).

$$\xi = f(x, y, t) = \frac{\cos(t)}{x^2 + y^2 + 24}$$

$$\lim_{(x,y,t)\to(0,0,0)} f(x,y,t) = \frac{\cos(0)}{0^2+0^2+24} = \frac{1}{24} \text{ feet}$$


As resistivity and length of a wire get closer
to zero, the resistance of a wire becomes zero. As its area
gets closer to zero, the resistance is infinite, limit DNE.
Supporting Work:
R = ρL/A
ρ : resistivity
L : length
A : cross sectional area
Lim R(ρ, L, a) = DNE



Supporting Work:

$L_F = L_i + \frac{PL}{AE}$

$\lim_{(L_i, P, A, E) \to (2.5, 3, M)} L_F(L_i, P, A, E) = 2.5 \text{ in.}$

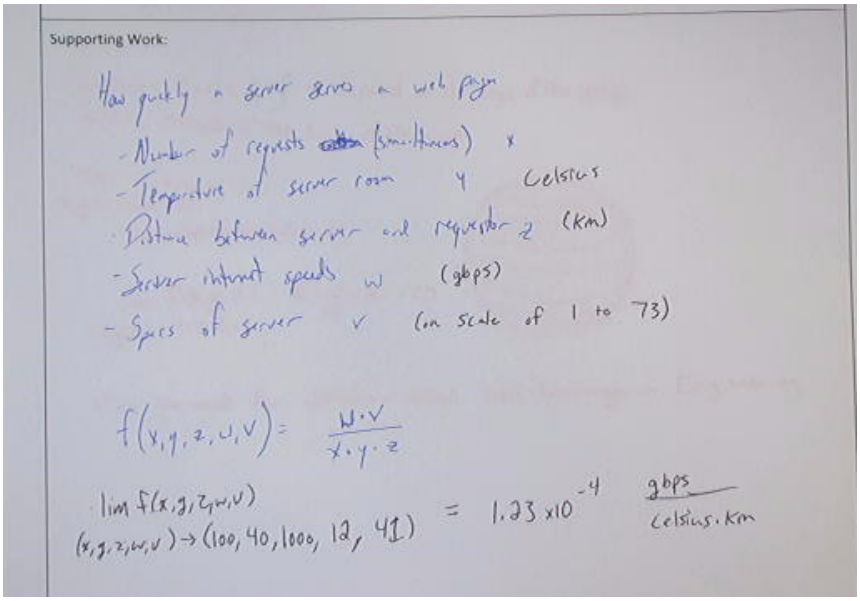
$L_F = L_i + \frac{4PL}{\pi d^2 E} + L_i a(\Delta T)$

$\lim_{\substack{P \to 5 \text{ KIPS} \\ \Delta T \to 10°C}} L_i + \frac{4PL}{\pi d^2 E} + L_i a(\Delta T)$

AS LOAD APPROACHES 5 KIPS
AS CHANGE IN TEMPERATURE APPROACHES 10°C

THE FINAL LENGTH IN A METAL MATERIAL IS THE INITIAL LENGTH PLUS THE BEARING LOAD PER YOUNGS MODULUS TIMES THE CROSS SECTIONAL AREA PLUS THE INITIAL LENGTH MULTIPLIED BY THE LINEAR EXPANSION COEFFICIENT MULTIPLIED BY THE CHANGE IN TEMPERATURE

THE FINAL LENGTH OF A METAL IS DETERMINED BY THE INITIAL LENGTH TO THE ELONGATION DUE TO LOAD PLUS THE ELONGATION DUE TO THE CHANGE IN TEMPERATURE



Supporting Work:

How quickly a server serves a web page

- Number of requests ~~(connections)~~ (simultaneous) x
- Temperature of server room y Celsius
- Distance between server and requestor z (km)
- Server internet speeds w (gbps)
- Specs of server v (on scale of 1 to 73)

$$f(x,y,z,w,v) = \frac{w \cdot v}{x \cdot y \cdot z}$$

$$\lim_{(x,y,z,w,v) \to (100, 40, 1000, 12, 41)} f(x,y,z,w,v) = 1.23 \times 10^{-4} \ \frac{\text{gbps}}{\text{Celsius} \cdot \text{km}}$$

Supporting Work:

Function " $x^2+y^2+z^2$ ": f → depend on the size of the wall

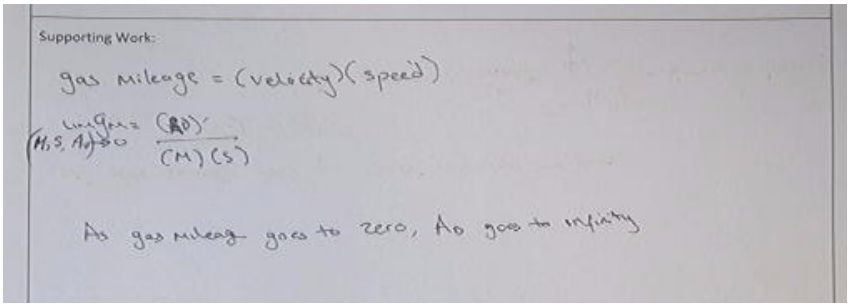
Use to calculate the size of the wall

$\lim_{x,y,z \to (0,0,0)} f(x,y,z) = 0$

~~x, y, z to Point (0,0,0)~~

$\lim_{(x,y,z) \to (0,0,0)} f(x,y,z) = x^2+y^2+z^2 = 0$

Can be used for different sized ball bearings in Engineering.


Supporting Work:

gas mileage = (velocity)(speed)

Units: $\frac{(A)^2}{(M)(S)}$

As gas mileage goes to zero, A_0 goes to infinity