12-09-25 MTH 167-004N

Last class before final exam
General review

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Omit absolute value inequalities

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MTH 167 student,

You are receiving this email because you are enrolled in a Fall 2025 section of MTH 167 at NOVA.

Every semester, the mathematics discipline assesses student learning in at least one class, for a particular topic. This semester, we have chosen MTH 167.

We assess what you have learned in a short quiz through google.

PLEASE RESPOND TO THIS SHORT SURVEY NO LATER THAN Tuesday, December 16.

You can access the survey by clicking on the link below.

https://docs.google.com/forms/d/e/1FAIpQLScRXcpi4nifLMNg9vYXjpPJ4H6GYMNM1RnL0K7Agvz3oYLvYw/viewform?usp=header

You may find it helpful to have pencil and paper handy. Calculators are permitted, but not necessary. You are expected to work independently without the use of any resources. there is no time limit on this quiz, but you should be able to finish in 5 – 10 minutes.

Before taking this short assessment, please ensure you know the following:

- your EMPLID (student ID number)

- the section of the MTH 167 course you are taking (i.e. 001A)

Data is collected to determine how we can improve instruction for particular topics. Your EMPLID is collected so we can disaggregate the data by various characteristics, such as your major. The answers and scores for individual students are not shared with your instructor.

A COPY OF YOUR RESPONSES WILL BE EMAILED TO YOUR NOVA EMAIL.

Thank you for your participation. Your responses will help us improve teaching and learning in MTH 167.

The NOVA Math Success Team

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Solve the system of equations by reducing the augmented matrix to rref, using elementary row operations. Then, check with calculator.

$$18.\quad \begin{cases} 2x - y + z &= -1 \\ 4x + 3y + 5z &= 1 \\ 5y + 3z &= 4 \end{cases}$$

Augmented matrix

$$\left(\begin{array}{ccc|c} 2 & -1 & 1 & -1 \end{array} \right.$$

$$\left[\begin{array}{ccc|c} 2 & -1 & 1 & -1 \\ 4 & 3 & 5 & 1 \\ 0 & 5 & 3 & 4 \end{array}\right] R2-2R1$$

$$\left[\begin{array}{ccc|c} 2 & -1 & 1 & -1 \\ 0 & 5 & 3 & 3 \\ 0 & 5 & 3 & 4 \end{array}\right] \begin{array}{l} R1/2 \\ \\ R3-R2 \end{array}$$

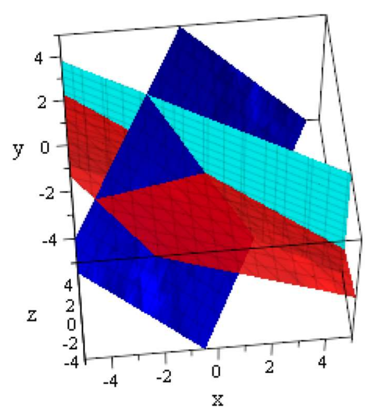
$$\left[\begin{array}{ccc|c} 1 & -\frac{1}{2} & \frac{1}{2} & -\frac{1}{2} \\ 0 & 5 & 3 & 3 \\ 0 & 0 & 0 & 1 \end{array}\right] R2/5$$

$$\left[\begin{array}{ccc|c} 1 & -\frac{1}{2} & \frac{1}{2} & -\frac{1}{2} \\ 0 & 1 & \frac{3}{5} & \frac{3}{5} \\ 0 & 0 & 0 & 1 \end{array}\right] \text{rref}$$

$$0\cdot x + 0\cdot y + 0\cdot z = 1$$

$$0 = 1$$

system is inconsistent



The graph shows three planes that do not Intersect in a single point or a line.

What is the equation of the horizontal asymptote for the rational function $h(x) = \frac{6x^3 - 3x + 1}{5 - 2x^3}$?

A. $y = -3$

B. There is no horizontal asymptote.

C. $y = \frac{1}{5}$

D. $y = 0$

Let $f(x) = x^2 - 4x$ and $g(x) = 2 - \sqrt{x+3}$. What is the domain of the composite function $(g \circ f)(x)$?

A. $[-3, \infty)$

B. $(-\infty, 1] \cup [3, \infty)$

C. $(-\infty, \infty)$

D. $[1, 3]$

$$(g \circ f)(x) = g(f(x))$$

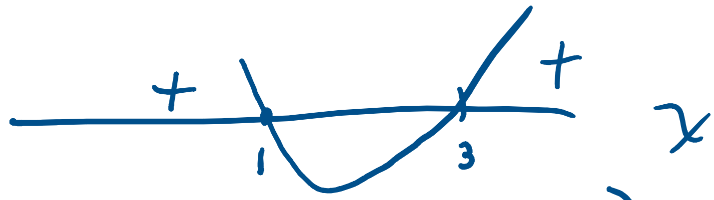
$$= g(x^2 - 4x)$$

$$= 2 - \sqrt{(x^2 - 4x) + 3}$$

$$= 2 - \sqrt{x^2 - 4x + 3}$$

solve $x^2 - 4x + 3 \geq 0$

$$(x-1)(x-3) \geq 0$$



interval notation $(-\infty, 1] \cup [3, \infty)$

set-builder notation $\{x \mid x \le 1 \text{ or } x \ge 3\}$

Which of the following expressions is equivalent to $2\ln(x) - 3\ln(y) - 4\ln(z)$?

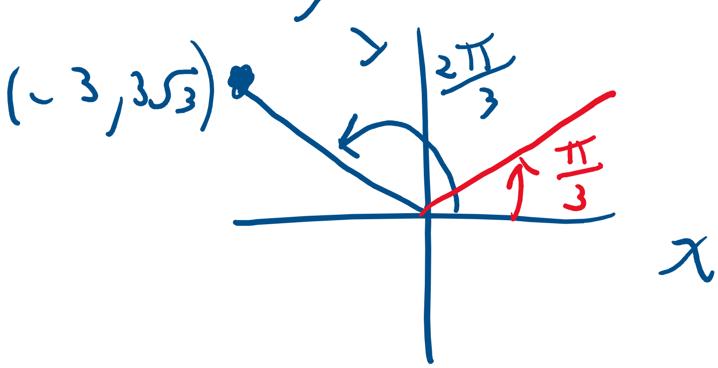
Combine into single log expression.

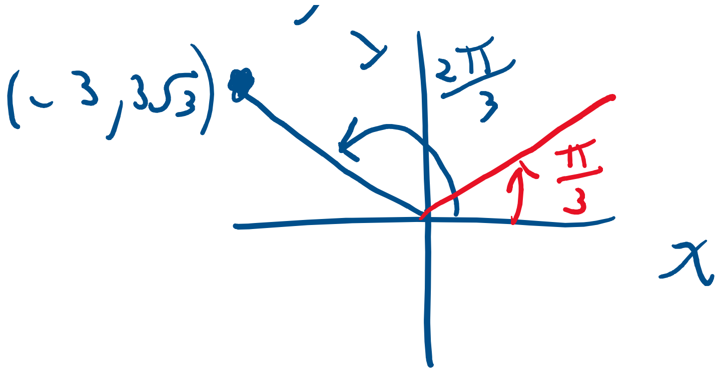
$$= \ln(x^2) - \ln(y^3) - \ln(z^4)$$
$$= \ln\left(\frac{x^2}{y^3}\right) - \ln(z^4)$$
$$= \boxed{\ln\left(\frac{x^2}{y^3 z^4}\right)}$$

Convert polar coordinates to rectangular coordinates and plot the point.

Which of the following are the rectangular coordinates (x, y) for the point given by the polar coordinates $(r, \theta) = (6, \frac{2\pi}{3})$?

$$x = r\cos\theta = 6\cos\left(\frac{2\pi}{3}\right) = \left(-\frac{1}{2}\right)(6)$$
$$y = r\sin\theta = 6\sin\left(\frac{2\pi}{3}\right) = \left(\frac{\sqrt{3}}{2}\right)(6)$$





Given the function $f(x) = \frac{2x}{1-x}$, what is its inverse, $f^{-1}(x)$?

Prove f(x) is 1-1. Then find its inverse

1-1 show $f(c) = f(d) \Rightarrow c = d$

$$\frac{2c}{1-c} = \frac{2d}{1-d}$$

$$\cancel{2}c(1-d) = \cancel{2}d(1-c)$$

$$c - cd = d - cd$$

$$c = d$$

$\therefore f$ is 1-1

$\therefore f^{-1}$ exists

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

$$y = \frac{2x}{1-x}$$

$$x = \frac{2y}{}$$

$$x = \frac{2y}{1-y}$$

solve for y

$$x(1-y) = 2y$$

$$x - xy = 2y$$

$$2y + xy = x$$

$$y(2+x) = x$$

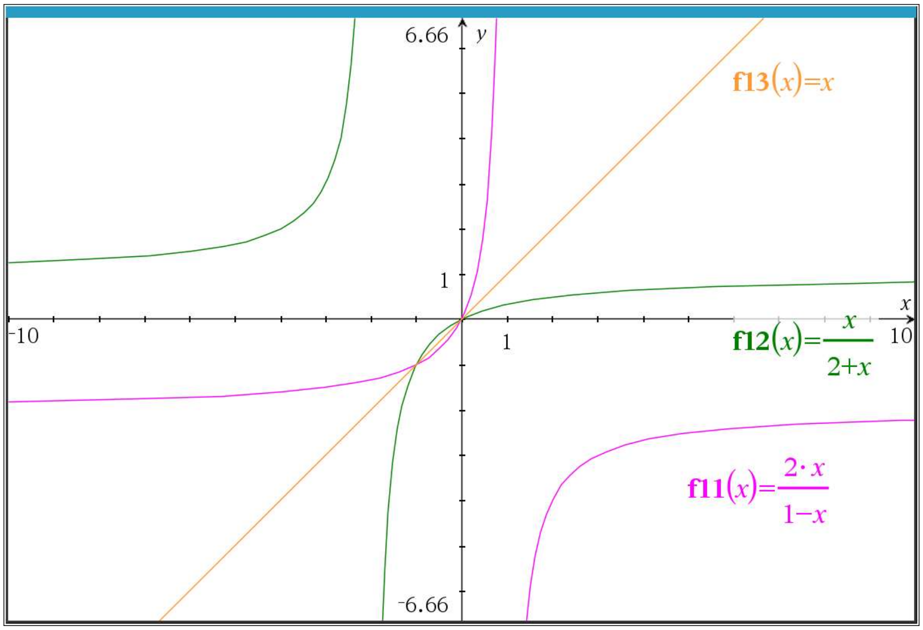
$$y = \frac{x}{2+x}$$

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

$$(f \circ f^{-1})(x) = f(f^{-1}(x))$$

$$= f\left(\frac{x}{2+x}\right) = \frac{\frac{2x}{2+x}}{1 - \frac{x}{2+x}}$$

$$= \frac{\frac{2x}{\cancel{2+x}}}{\frac{2+x-x}{\cancel{2+x}}} = \frac{2x}{2+x-x} = \frac{2x}{2} = x \checkmark$$



The function and its alleged inverse appear to be symmetric with the graph of y = x.

The graph of a polynomial function $p(x)$ crosses the x-axis at $x = -2$ and touches (but does not cross) the x-axis at $x = 3$. Which of the following factorizations is consistent with this behavior?

A. $p(x) = (x-2)(x+3)^2$

B. $p(x) = (x+2)(x-3)^2$

C. $p(x) = (x+2)(x-3)$

D. $p(x) = (x+2)^2(x-3)$