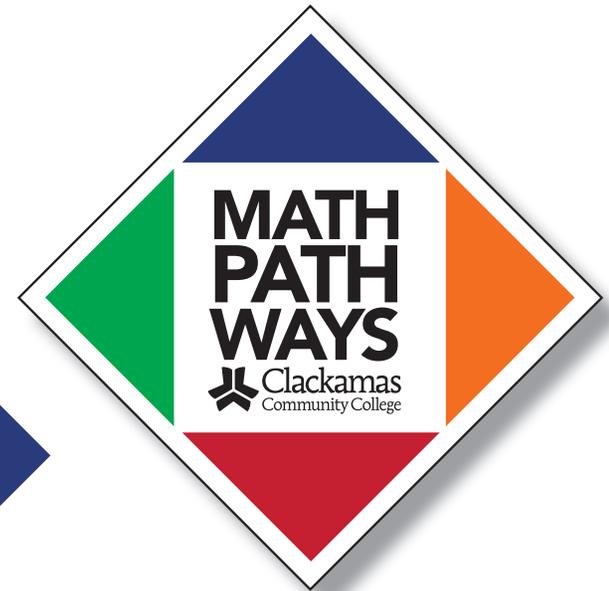


Want to find out which math path is right for your academic and career goals? Contact a CCC academic advisor at 503-594-3475 for help with choosing or switching your math path.

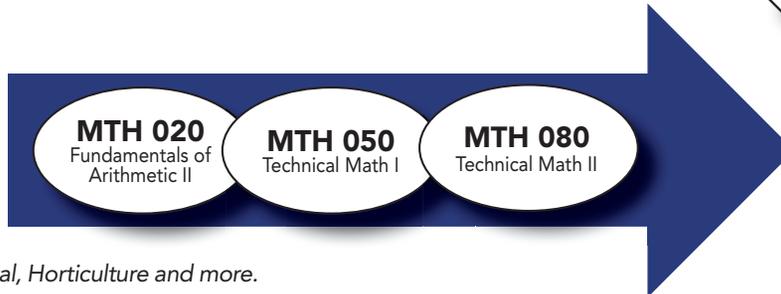
Transferring to a university? Choose the green or orange path.



CAREER TECH PATH (1-2 YEAR)

Jobs in this path include:

Automotive, Welding, Dental, Horticulture and more.



STEM PATH (TRADITIONAL)

Jobs in this path include:

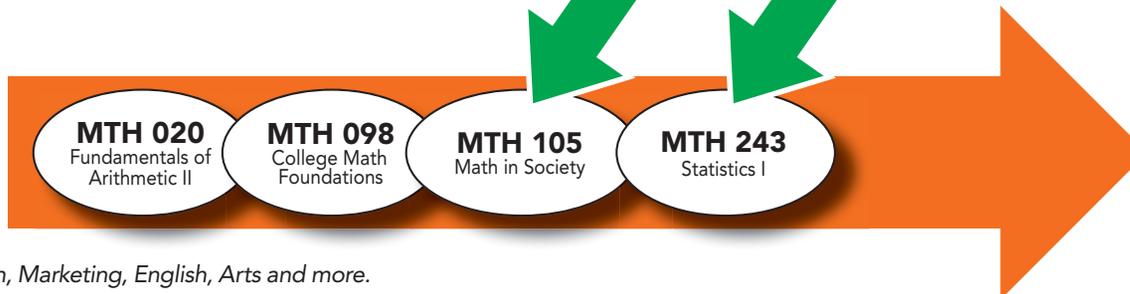
Science, Engineering, Chemistry and more.



STATS PATH

Jobs in this path include:

Psychology, Communication, Marketing, English, Arts and more.



How well do you know Arithmetic II (MTH 020)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

If you answered **YES** to at least two of the above questions, you should consider taking the next level math course.

MTH-60 (STEM)

MTH-050 (TECH)

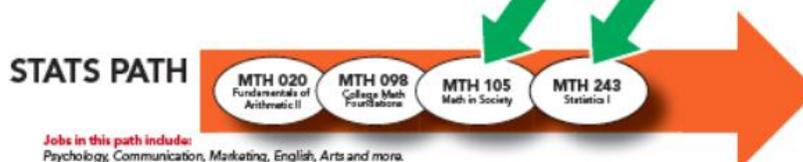
MTH-098 (STATS)

Want to find out which math path is right for your academic and career goals? Contact a CCC academic advisor at 503-594-3475 for help with choosing or switching your math path.

Transferring to a university? Choose the **green** or **orange** path.



- Simplify positive and negative expressions with exponents and parenthesis:
 - $-5 - (-11)$
 - $(-2)^3 + (-3)(2)$
- Simplify fraction, proportion and percent problems:
 - $\frac{2}{3} \div \frac{6}{7}$
 - $2\frac{1}{4} + 1\frac{2}{3}$
 - $\left(\frac{2}{3}\right)^2 - \left(\frac{4}{3}\right)\left(\frac{1}{3}\right)$
 - How many pieces of rope that are $\frac{3}{4}$ feet long can be cut from a piece of rope that is $6\frac{3}{4}$ feet long?
 - Solve for "x": $\frac{3}{4} = \frac{9}{x}$
 - What is 40% of 380?
 - What percent of 80 is 72?
- Solve basic geometry problems:
 - Find the circumference and area of a circle with radius 8 cm.
 - Find the area of a triangle with height=6 in and base = 12 in.



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Answer Key

1a. 6

1b. -14

2a. $\frac{7}{9}$

2b. $3\frac{11}{12}$

2c. 0

2d. 9

2e. 12

2f. 152

2h. 90%

3a. C=50.3 cm

3a. A=201 cm²

3b.36 in²

How well do you know Algebra I (MTH 060)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

If you answered **YES** to at least two above questions, you should consider taking the next level math course.

MTH-065 (STEM)

MTH-080 (TECH)

MTH-098 (STATS)

Instructions: Read all instructions carefully; show all work; simplify all expressions. Include units, where appropriate.

1. Evaluate each expression.

a. $4 - 2(3 + 7)$

b. $-(3 + 2 \cdot 5)^2$

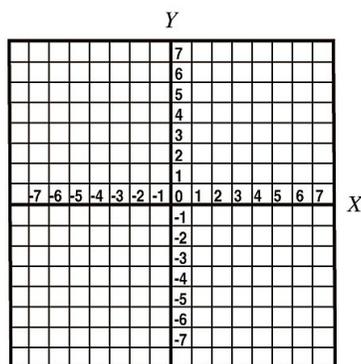
2. Solve each equation.

a. $2x + 6 = 5$

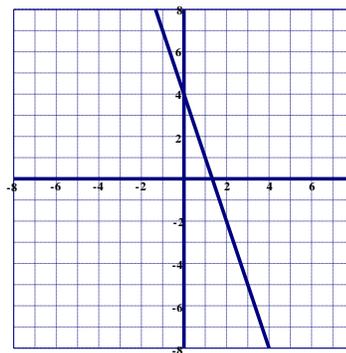
b. $3(x - 5) + 1 = x + 4$

3. Graph the equation.

$y = 2x - 5$



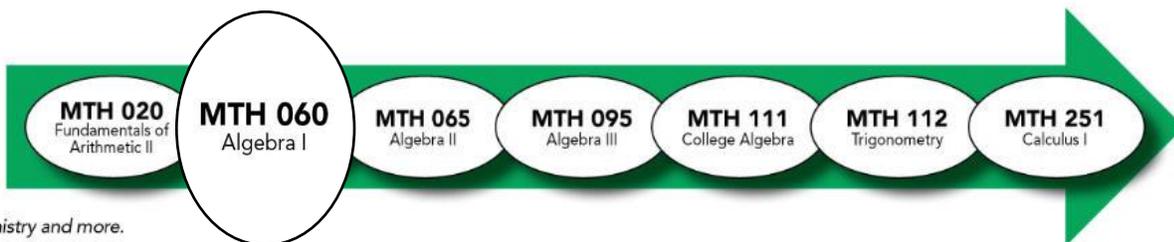
4. Give the equation of the line shown (in **slope-intercept** form).



5. Find the equation of the line (in **slope-intercept** form) passing through each pair of points. a. $(-2, 5)$ and $(0, 2)$

STEM PATH
(TRADITIONAL)

Jobs in this path include:
Science, Engineering, Chemistry and more.



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Answer Key

1. Evaluate each expression.

a. $4 - 2(3 + 7) = -16$

c. $-(3 + 2 \cdot 5)^2 = -169$

2. Solve each equation.

a. $2x + 6 = 5$

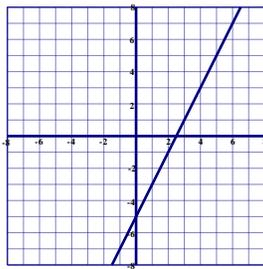
$$x = -\frac{1}{2}$$

b. $3(x - 5) + 1 = x + 4$

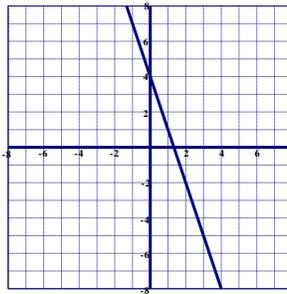
$$x = 9$$

3. Graph each equation.

$$y = 2x - 5$$



4. Give the equation of the line shown
(in **slope-intercept** form).



$$y = -3x + 4$$

5. Find the equation of the line (in **slope-intercept** form) passing through each pair of points.

a. $(-2, 5)$ and $(0, 2)$

$$y = -\frac{3}{2}x + 2$$

How well do you know Algebra II (MTH 065)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

If you answered YES to at least two of the above questions, you should consider taking the next level math course.

MTH-095 (STEM)

MTH-080 (TECH)

MTH-098 (STATS)

Instructions: Be sure to simplify all expressions. Include units, where appropriate.

1. Exponents: Simplify... Assume that all variables represent positive real numbers. Write answers in simplest form (all exponents should be positive and no variable should appear more than once).

$$\frac{(5r^{-4})(3r^2)^2(b^2)^0}{r^{-10}}$$

2. Polynomials: Report your result as a simplified polynomial in descending order.

a) Subtract $-7x^4 + 6 + 5x^8$ from $2x^4 + 6 - 3x^8 + 10x$.

b) Multiply $4x(x - 2y)^2$.

3. Completely factor:
 $3b^3 - 15b^2 - 42b$

4. Solve each system of equations algebraically. If a unique solution does not exist, state whether the system is dependent or inconsistent.

$$3x + 4y = 21$$

$$2x - 2y = 7$$

**STEM PATH
(TRADITIONAL)**

MTH 020
Fundamentals of
Arithmetic II

MTH 060
Algebra I

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MTH 095
Algebra III

MTH 111
College Algebra

MTH 112
Trigonometry

MTH 251
Calculus I

Jobs in this path include:
Science, Engineering, Chemistry and more.



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Answer Key:

1. $45r^{10}$

2. a) $-8x^8 + 9x^4 + 10x$

b) $4x^3 - 16x^2y + 16xy^2$

3. $3b(b-7)(b+2)$

4. $\left\{ \left(5, \frac{3}{2} \right) \right\}$

How well do you know Algebra III (MTH 095)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

If you answered YES to at least two of the above questions, you should consider taking the next level math course.

MTH-111 (STEM)
MTH-105 (STATS)

1. Solve different types of equations algebraically:

a. Quadratic: $2x^2 = x + 3$

b. Rational: $\frac{3}{2} + \frac{2}{2x-4} = \frac{1}{x-2}$

c. Exponential: $9 = 3^{x+8}$

d. Logarithmic: $\log_4(2x + 5) = 2$

2. Simplify different types of expressions:

a. Rational: $\frac{x^2-4}{x+2} \cdot \frac{3x-18}{x^2-7x+6}$

b. Logarithmic: $3\log(x) + 5\log(y) - \frac{1}{2}\log(z)$

c. Radical: $(80x^3y^6)^{1/3}$

3. Graph different types of functions:

a. Quadratic: $f(x) = -x^2 + 6x - 11$ (find vertex, intercepts, and sketch a graph)

b. Rational: $f(x) = \frac{2x-6}{x+1}$ (Find the intercepts, asymptotes, and sketch a graph)

STEM PATH
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Science, Engineering, Chemistry and more.



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1a. $\left\{\frac{3}{2}, -1\right\}$

1b. $x = 2$ is an extraneous solution

1c. $x = -6$

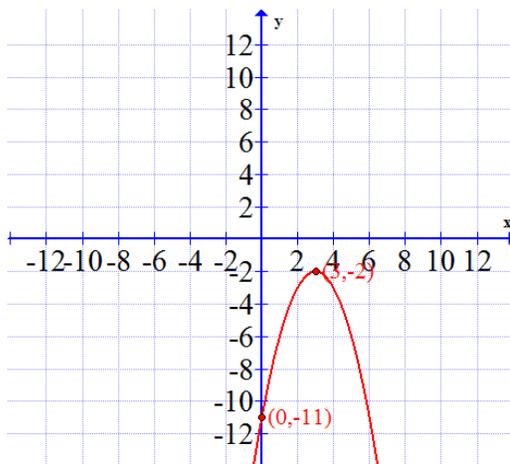
1d. $x = \frac{11}{2}$

2a. $\frac{3x-6}{x-1}$

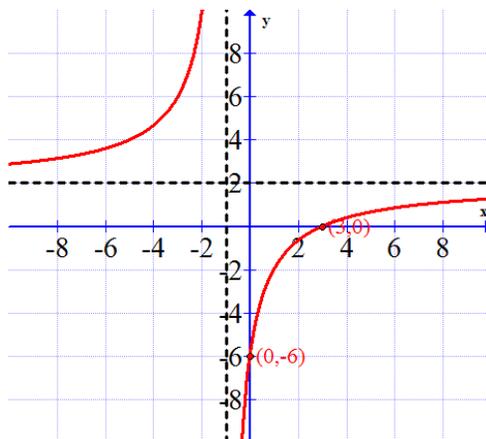
2b. $\log\left(\frac{x^3 y^5}{\sqrt{z}}\right)$

2c. $2\sqrt[3]{10xy^2}$

3a.



3b.



How well do you know College Algebra (MTH 111)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

(See next page for additional MTH-111 review problems.)

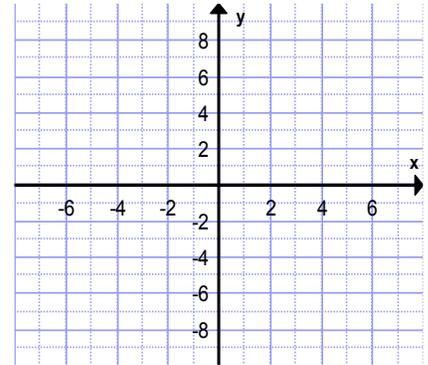
1. Consider the function below:

$$f(x) = \begin{cases} x^2 - 8 & \text{if } -4 \leq x \leq 2 \\ -2x + 8 & \text{if } 2 < x < 6 \end{cases}$$

Sketch a graph of f on the grid provided.

Evaluate $f(2)$

Find all values where $f(x) = -4$



2. Algebraically solve the following equations for real or complex solutions. Be sure to simplify all answers and check for extraneous solutions when appropriate.

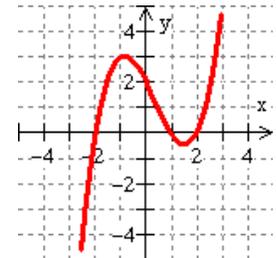
a. $3x^{\frac{3}{2}} - 11 = 13$

b. $\sqrt{x-4} + x = 6$

c. $\frac{3-2x}{x+2} = 12$

3. Find the polynomial function with the given graph. Leave your answer in factored form.

Degree 3 (you'll have to find the leading coefficient)



4. Consider the rational function,

Give the equation(s) of any vertical asymptote(s).

$$g(x) = \frac{5(x+4)(x-2)}{2(x+3)(x-5)}$$

5. Answer the following about functions f and g represented by the tables below.

x	-2	-1	0	1	2
$f(x)$	1	0	2	-2	3

x	-2	-1	0	1	2
$g(x)$	2	3	-2	-1	0

a. $g(-2)$

b. $(f+g)(-2)$

c. $(f \circ g)(-2)$

STEM PATH
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MTH 112
Trigonometry

MTH 251
Calculus I

Jobs in this path include:
Science, Engineering, Chemistry and more.

How well do you know College Algebra (MTH 111)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

If you answered YES to at least three of the above questions, you should consider taking the next level math course.

MTH-112 (STEM)

MTH-243 (STATS)

6. Solve the following equations. Give exact values when possible; otherwise round to four decimal places.

a. $8^x = \frac{1}{4}$

b. $\log(3x - 5) = 0$

7. Find the sum of the following. Show all work.

$$\sum_{k=3}^5 (k^2 - 5)$$

8. Expand $(x + 4)^6$ and simplify.

**STEM PATH
(TRADITIONAL)**

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MTH 111
College Algebra

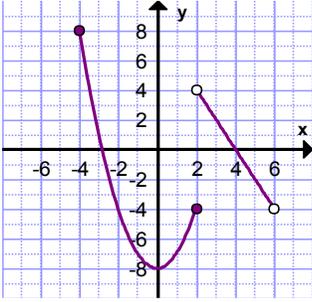
MTH 112
Trigonometry

MTH 251
Calculus I

Jobs in this path include:
Science, Engineering, Chemistry and more.

Answer Key:

1. a.



b. $f(2) = -4$

c. $x = 2$ and $x = -2$

2. a. $x = \pm 2\sqrt{2}$

b. $x = 5$ (note: $x = 8$ is an extraneous root)

c. $x = -3/2$

3. a. $f(x) = \frac{1}{2}(x+2)(x-1)(x-2)$

4. Vertical asymptote: $x = 5$ or $x = -3$

5. a. 2 b. 3 c. 3

6. a. $x = -2/3$ b. $x = 2$

7. a. 35

8. $x^6 + 24x^5 + 240x^4 + 1280x^3 + 3840x^2 + 6144x + 4096$

How well do you know Trigonometry (MTH 112)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

If you answered YES to at least two of the above questions, you should consider taking the next level math course.

MTH-251 (STEM)
MTH-243 (STATS)

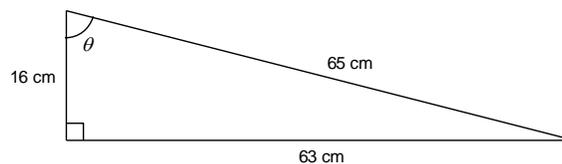
Instructions: Read all instructions carefully; simplify all expressions. Include units and round results as directed.

Remember to check degree/radian mode!

1. Convert 86.2° to radians (4 decimal places).

2. Convert $\frac{4\pi}{7}$ to degrees (1 decimal place).

3. Consider the triangle shown.



(a) Find the six trigonometric functions of θ (exact-value answers).

(b) Find the measure of θ (to the nearest tenth degree).

4. Give an exact-value result for $\tan 105^\circ$.

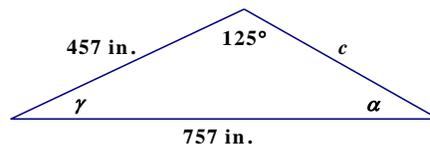
5. Consider the equation $4 \sin\left(x - \frac{\pi}{6}\right) + 3 = 5$.

(a) Find all solutions to the equation on the interval $[0, 2\pi)$ (exact values).

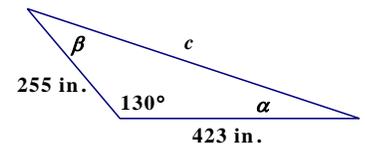
(b) Find all real-number solutions to the equation.

6. Solve and find the area of each triangle.

(a)



(b)



STEM PATH
(TRADITIONAL)

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Jobs in this path include:

Science, Engineering, Chemistry and more.



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Answer Key

1. 1.5045

2. 102.9°

3. (a) $\sin \theta = \frac{63}{65}$; $\cos \theta = \frac{16}{65}$; $\tan \theta = \frac{63}{16}$; $\csc \theta = \frac{65}{63}$; $\sec \theta = \frac{65}{16}$; $\cot \theta = \frac{16}{63}$

(b) 75.7°

4. $-2 - \sqrt{3}$

5. (a) $\left\{ \frac{\pi}{3}, \pi \right\}$; (b) $\left\{ x \mid x = \frac{\pi}{3} + 2n\pi \text{ or } x = \pi + 2n\pi = (2n+1)\pi \right\}$

6. (a) $\alpha \approx 29.64^\circ$, $\gamma \approx 25.36^\circ$, $c \approx 395.8$ in., Area $\approx 74,086$ in.²;

(b) $c \approx 618.6$ in., $\alpha \approx 18.41^\circ$, $\beta \approx 31.59^\circ$, Area $\approx 41,315$ in.²

How well do you know Calculus I (MTH 251)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

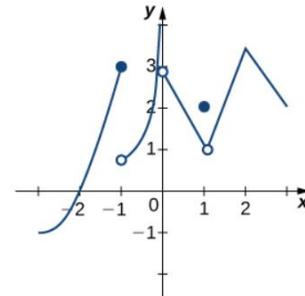
If you reviewed this material, would you be able to solve most of these problems using algebraic techniques?

(See next page for additional Math 251 problems and the answer to all problems.)

1. Use the definition of the limit, $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ to determine the derivative of $f(x) = x^2 - 5x + 3$.

2. Let $f(x) = \begin{cases} e^{kx} & 0 \leq x < 4 \\ x + 3 & 4 \leq x \leq 8 \end{cases}$
What is the value of k such that the function will be continuous over the interval $[0,8]$?

3. Consider the piecewise function at the right.
a. Find all values for which $f(x)$ is discontinuous.
b. Classify any discontinuities as jump, removable, or infinite.



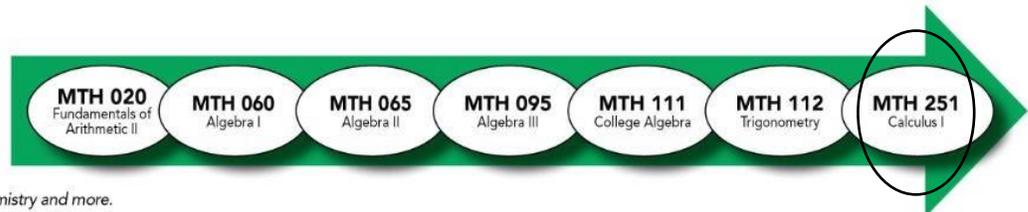
4. Let the position function, $s(t) = t^2 - 3t - 4$, represent the position of the back of a car which is reversing out of the garage into the driveway and then driving into the street where s is in feet and t is in seconds. Let $s(t)=0$ represent the position in which the back of the car lines up with the garage door.

- a What does $s(0) = -5$ represent?
- b What is the velocity when $s(t)=0$?
- c What is the velocity when $s(t)=14$?
- d What is the acceleration when $s(t)=14$?

Updated as of 10.2022

**STEM PATH
(TRADITIONAL)**

Jobs in this path include:
Science, Engineering, Chemistry and more.



How well do you know Calculus I (MTH 251)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems?

If you answered YES to at least five of the above questions, you should consider taking the next level math course:

MTH-252 (Calculus II)

5. a. Find the equation of the line which is tangent to $f(x) = (3x + \frac{1}{x})^2$ at the point (1,16).
b. Using linearization, estimate $f(1.02)$.
6. For $f(x) = x + \sin(2x)$ over $[-\frac{\pi}{2}, \frac{\pi}{2}]$, find:
 - a. Where $f(x)$ is increasing and decreasing.
 - b. The local minimums and maximums.
 - c. The intervals where $f(x)$ is concave up and down.
7. a. Determine the x-intercepts for $x^2 + xy + y^2 = 7$.
b. Using implicit differentiation, find the slope of the tangent lines at those x-intercepts.
8. The volume of a cube decreases at a rate of $10 \text{ m}^3/\text{sec}$. Find the rate at which the side of the cube changes when the side length is 2 meters.

Answers:

1. $f'(x) = 2x - 5$
2. $k = \frac{\ln(7)}{4}$
3. Discontinuities: Jump: $x=-1$; infinite: $x=0$;
removable: $x=1$
4. a. The car is 5 feet inside the garage.
b. $5 \text{ ft}/\text{sec}$
c. $9 \text{ ft}/\text{sec}$
d. $2 \text{ ft}/\text{sec}^2$
5. a. $y = 16x$; b. 16.32
6. a. Increasing: $(-\frac{\pi}{3}, \frac{\pi}{3})$; Decreasing: $(-\frac{\pi}{2}, -\frac{\pi}{3}) \cup (\frac{\pi}{3}, \frac{\pi}{2})$
b. $x = -\frac{\pi}{3}$ (min.), $x = \frac{\pi}{3}$ (max.)
c. Concave up: $(-\frac{\pi}{2}, 0)$; Concave down: $(0, \frac{\pi}{2})$
7. a. $(0, -\sqrt{7}), (0, \sqrt{7})$; b. $\frac{dy}{dx} = -2$
8. $\frac{dx}{dt} = -\frac{5 \text{ m}}{6 \text{ sec}}$

**STEM PATH
(TRADITIONAL)**

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MTH 251
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Jobs in this path include:
Science, Engineering, Chemistry and more.



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How well do you know Calculus II (MTH 252)?

Do these math problems look familiar to you?

Have you learned these types of problems in prior math classes?

If you reviewed this material, would you be able to solve most of these problems using algebraic techniques?

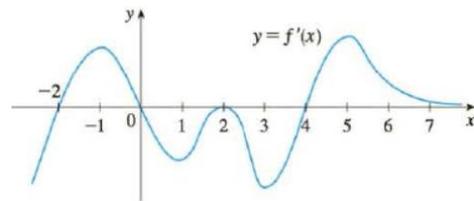
If you answered YES to at least six of these questions, you should consider taking the next level math course:

MTH-253 (Calculus III)

(See next page for answer to these MTH-252 problems.)

- Find the area of the region under the curve, $f(x) = (x - 1)^3 + 4$, on the interval $[0,2]$ using:
 - a left-end approximation with $n=4$.
 - a right-end approximation with $n=4$.
- Find the following anti-derivatives:
 - $\int \frac{x}{\sqrt{x-1}} dx$
 - $\int x e^{4x^2+3} dx$
 - $\int \ln(\cos x) \tan(x) dx$
 - $\int \frac{1}{\sqrt{9-x^2}} dx$
 - $\int x \cos(x) dx$
- Find the exact average value f_{ave} of $f(x) = \cos(x)$ between 0 and 2π . Then determine the exact number c in $[0,2\pi)$ where $f(c) = f_{ave}$.
- Find the area bounded by $f(x) = x^2$, $g(x) = 2 - x$, and the x -axis.
- Determine the volume of the solid formed by revolving the region bounded between the function $f(x) = \frac{1}{x}$ and the x -axis over the interval $[1,2]$.
- Determine the arc length for the function $f(x) = x^2$ over the interval $[1,3]$. (Note: After setting up the integral, a calculator or online program can be used to evaluate this definite integral.)
- Evaluate $\int_{0.1}^{0.5} \frac{\cos(x)}{x} dx$ using Simpson's rule with $n=4$.

- Given the graph of $y = f'(x)$, determine the following about the antiderivative, $f(x)$:



- On what intervals is $f(x)$ increasing?
 - On the interval $(-2,7)$, at what x values does $f(x)$ have a local max? local min?
 - On the interval $(-2,7)$, where is $f(x)$ concave up? Concave down?
- Assume a tank is in the shape of an inverted cone. The height of the tank is 12 feet and the base radius is

4 feet. The tank is full at the beginning and water is pumped out until the height of the water is 4 feet. Determine the work done in pumping the water out of the tank using a weight density of 62.4 lb/ft^3 .

1. a. 7.5
b. 8.5
2. a. $\frac{2}{3}(x-1)^{\frac{3}{2}} + 2(x-1)^{\frac{1}{2}} + C$
b. $\frac{1}{2}e^{4x^2+3} + C$
c. $-\frac{1}{2}[\ln(\cos(x))]^2 + C$
d. $\sin^{-1}\frac{x}{3} + C$
e. $x\sin(x) + \cos(x) + C$
3. $c = \frac{\pi}{2}, \frac{3\pi}{2}$
4. $A = \frac{5}{6}$
5. $V = \frac{\pi}{2}$
6. Arc length ≈ 8.26815
7. 1.5629
8. a. Increasing: $(-2,0) \cup (4, \infty)$
b. Max: $x=0$; Min: $x=4$
c. Up: $(-2,-1) \cup (1,2) \cup (3,5)$; Down: $(-1,1) \cup (2,3) \cup (5,7)$
9. Work $\approx 33,456.7 \text{ ft} - \text{lb}$

Updated as of 10.2022

STEM PATH (TRADITIONAL)

Jobs in this path include:
Science, Engineering, Chemistry and more.

