COMMUNITY CHARTER SCHOOL OF CAMBRIDGE	Pre-Calculus → AP Calculus 2018 Summer Homework	Name: Due August 29, 2018

This summer assignment contains skills that should be mastered by the time students enter AP Calculus. Reaching fluency in these skills will make for a smoother year in AP Calculus. Furthermore, practicing math skills over the summer reduces summer learning loss. This means that you are less likely to be 'lost' in the content throughout next year if you space out this assignment over the course of the summer.

DO NOT complete this entire packet in one sitting. Completing the whole packet in one sitting defeats the purpose of practicing over the course of time. If you are a soccer player and practice once at the beginning of July for a game at the end of August, you will likely have a rough time in the game and probably lose. However, if you are a soccer player and practice even a few hours each week all summer for a game at the end of August, you will likely feel good and even win. The same idea applies to the skills you are practicing in this packet. If you do a few problems from each section per week and you should be fine.

BE RESOURCEFUL. If you do not remember a particular skill, the internet is there to help. Websites such as Khan Academy, Math is Fun, and even Youtube are full of great videos and tutorials that can help you review specific skills.

Last, this assignment is due on **August 29, 2018** (the first day of school) and will count as a **minor assessment.** This means that 10% will be docked for each day that it is late. It is in your best interest to do this packet well and to turn it in on time so that you can start the year with a strong grade.

Good luck! And, most importantly, enjoy your summer!

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Trigonometry

1. Find the exact values of the following trig ratios.

   (a) $\tan(\frac{5\pi}{3})$ (c) $\cos(\frac{9\pi}{4})$ (e) $\sec(\frac{5\pi}{6})$

   (b) $\sin(-\frac{10\pi}{3})$ (d) $\sin(\frac{34\pi}{6})$ (f) $\cot(-\frac{11\pi}{4})$

2. Find the value of θ in the following exercises.

   (a) $\cos\theta = -\frac{\sqrt{3}}{2}$ where $0 \leq \theta \leq 2\pi$

   (b) $\tan\theta = \frac{1}{\sqrt{3}}$ where $0 \leq \theta \leq 2\pi$

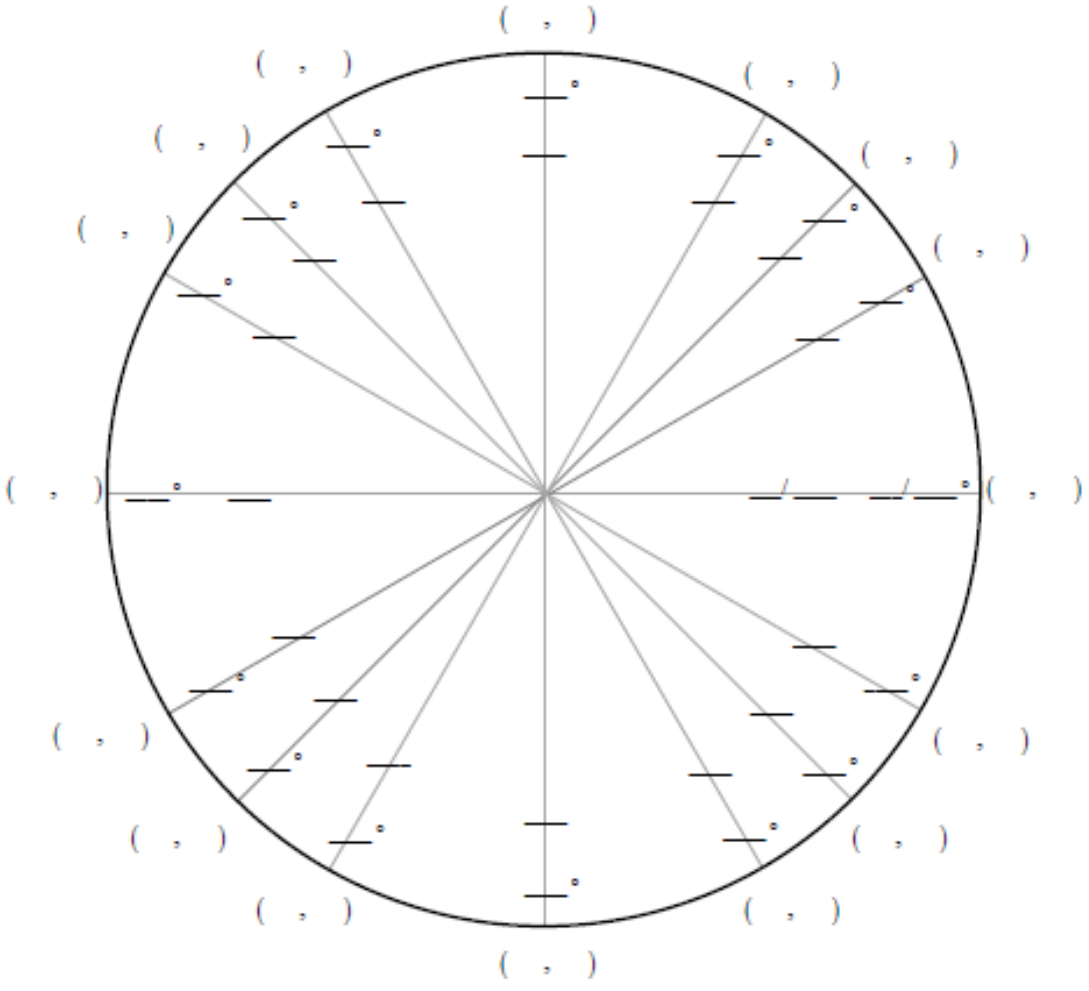
   (c) $\sin\theta = -\frac{\sqrt{3}}{2}$ where $-\pi \leq \theta \leq \pi$

   (d) $\sec\theta = -\sqrt{2}$ where $0 \leq \theta \leq 4\pi$

   (e) $\csc\theta = 2$ where $\frac{\pi}{2} \leq \theta \leq 2\pi$

   (f) $\tan^2\theta = 1$ where $0 \leq \theta \leq 2\pi$

3. Complete the unit circle.



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Quadratics

Factor the following quadratic functions and find their solutions.

4. $(x+1)^2 = 25$

5. $6x^2 = -12x$

6. $x^2 - 9 = 0$

7. $x^2 - 16 = 0$

8. $6x^2 - 24 = 0$

9. $x^2 + 7x + 6 = -6$

10. $(x-14)^2 = 36$

11. $5x^2 - 5x - 10 = 0$

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Laws of Exponents

Laws of Exponents		
product	$a^m \cdot a^n = a^{m+n}$	$2^2 \cdot 2^3 = (2\cdot2)(2\cdot2\cdot2) = 2^5$
quotient	$\frac{a^m}{a^n} = a^{m-n}$	$\frac{2^3}{2^2} = \frac{2\cdot\cancel{2}\cdot\cancel{2}}{\cancel{2}\cdot\cancel{2}} = 2^{3-1} = 2$
power	$(a^m)^n = a^{m\cdot n}$	$(2^2)^3 = (2\cdot2\cdot2)(2\cdot2\cdot2)(2\cdot2\cdot2) = 2^6$
inverse	$a^{-1} = \frac{1}{a}$	$2^{-1} = \frac{1}{2}$ (this is a definition)
zero power	$a^0 = 1$	Why? We need $a^m a^n = a^{m+n}$ when $m = 0$. In order for this law to be satisfied when $m = 0$, we have $a^n = a^{m+n} = a^{0+n} = a^0 a^n$, so a^0 must be 1.

12) $\left(5u^4v\right)\left(7u^4v^3\right)$	13) $\left(4a^4b^9c\right)^2$
14) $\left(5x^2y\right)^2\left(2xy^3z\right)^3$	15) $\left(-2u^2\right)\left(6u^6\right)$
16) $\left(\frac{2a^3b^5}{3}\right)^2$	17) $\left(14fg^2h^2\right)\left(-3f^4g^2h^2\right)$

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Logarithms and *e*

Simplify each of the following expressions.

18) e^0

19) e^1

20) $e^{\ln e}$

21) $\ln e$

21) $\ln 1$

22) $(\ln 3)(\ln 4)$

23) $\ln 8 \div \ln 4$

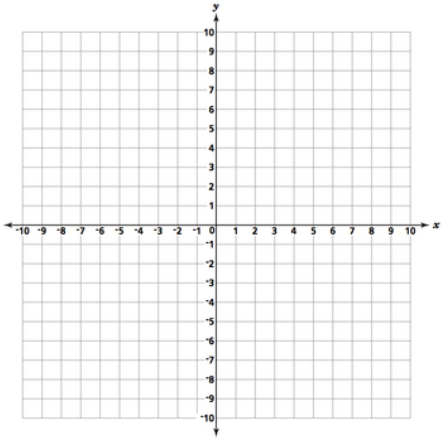
24) $e^{(\ln 3)+80}$

25) $e^{92+\ln 7}$

Function Analysis and Limits

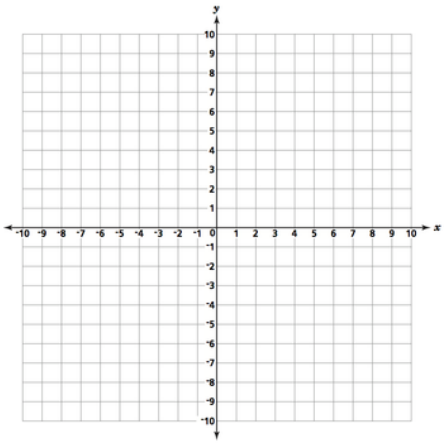
For each of the problems, sketch the function, and then find the following parts. If a part does not exist, write "DNE".

26) $f(x) = x^3 + 3x^2 - 2x - 3$



a) Domain:
b) Range:
c) Relative Maximum:
d) Relative Minimum:
e) $\lim_{x\to\infty} f(x) =$
f) $\lim_{x\to-\infty} f(x) =$
g) $\lim_{x\to 0} f(x) =$

27) $f(x) = \frac{x^2+x-6}{x^2+2x-3}$



a) Domain:
b) Range:
c) Relative Maximum:
d) Relative Minimum:
e) $\lim_{x\to\infty} f(x) =$
f) $\lim_{x\to-\infty} f(x) =$
g) $\lim_{x\to 1} f(x) =$

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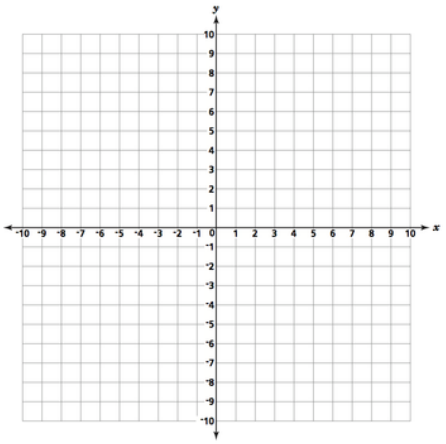
28) $f(x) = \frac{x^2-3x}{x^2-9}$



a) Domain:
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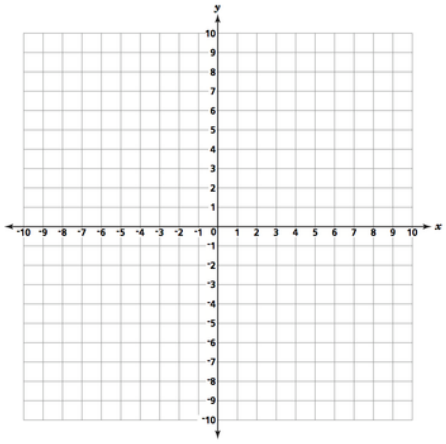
c) Relative Maximum:
d) Relative Minimum:
e) $\lim_{x\to\infty} f(x) =$
f) $\lim_{x\to-\infty} f(x) =$
g) $\lim_{x\to-3} f(x) =$

29) $f(x) = 5\sin(x-\pi)$



a) Domain:
b) Range:
c) Relative Maximum:
d) Relative Minimum:
e) $\lim_{x\to\infty} f(x) =$
f) $\lim_{x\to-\infty} f(x) =$
g) $\lim_{x\to\pi} f(x) =$

Piecewise Functions

Carefully graph each of the following. Identify whether or not the graph is a function and if it is continuous. Then, evaluate the graph at any specified domain value. You may use your calculator to help you graph, but you must sketch your graph carefully on the grid.

30)

$$f(x) = \begin{cases} x+5 & x < -2 \\ x^2+2x+3 & x \geq -2 \end{cases}$$

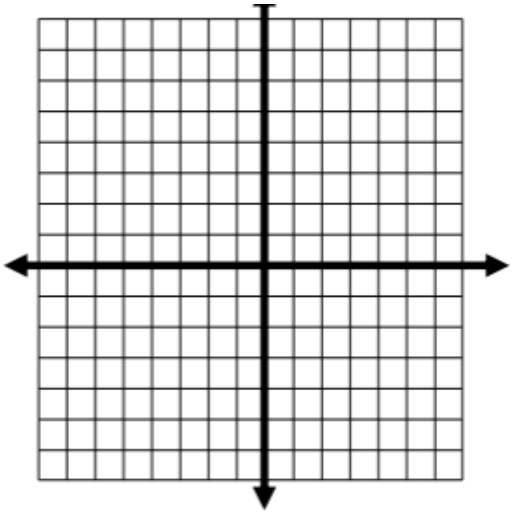
Domain:_____ Range:_____

Function: Yes No Continuous: Yes No

$f(3) =$

$f(-4) =$

$f(-2) =$



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31)

$$f(x)=\begin{cases}2x+1 & x\geq 1\\ x^2+3 & x<1\end{cases}$$

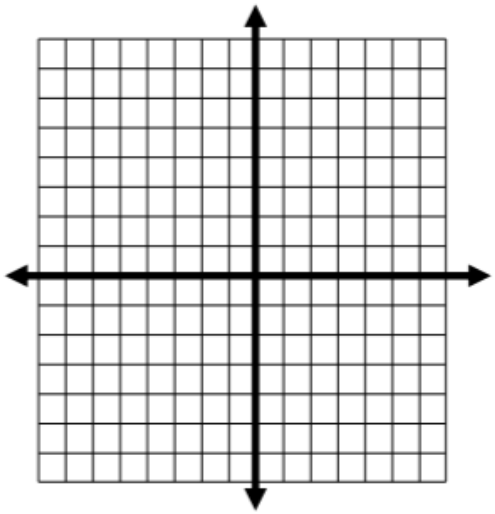
Domain:_____ Range:_____

Function: Yes No Continuous: Yes No

$f(-2)=$

$f(6)=$

$f(1)=$



32)

$$f(x)=\begin{cases}-2x+1 & x\leq 2\\ 5x-4 & x>2\end{cases}$$

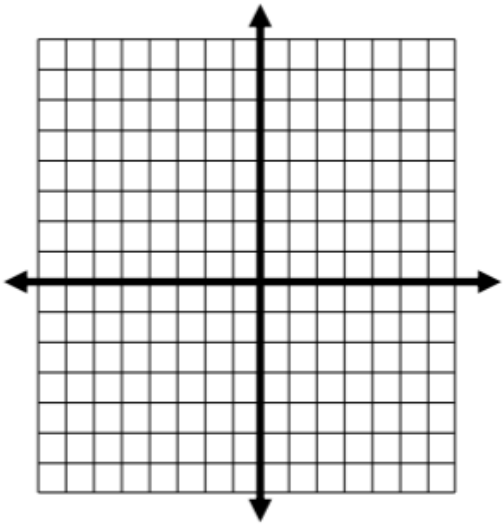
Domain:_____ Range:_____

Function: Yes No Continuous: Yes No

$f(-4)=$

$f(8)=$

$f(2)=$



33)

$$f(x)=\begin{cases}x^2-1 & x\leq 0\\ 2x-1 & 0<x\leq 5\\ 3 & x>5\end{cases}$$

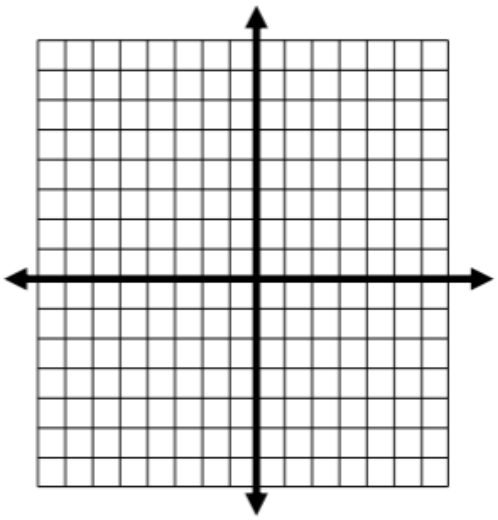
Domain:_____ Range:_____

Function: Yes No Continuous: Yes No

$f(-2)=$

$f(0)=$

$f(5)=$



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Rational Exponents and Radicals

Write each expression in radical form.

34) $x^{\frac{1}{2}}$ 35) $x^{\frac{4}{3}}$ 36) $7^{\frac{5}{3}}$

37) $2^{\frac{1}{6}}$ 38) $6^{\frac{3}{2}}$ 39) $x^{\frac{7}{5}}$

Write each radical in exponential form.

40) $\left(\sqrt{10}\right)^3$ 41) $\frac{1}{2\sqrt{x}}$ 42) $\frac{4}{\sqrt[6]{x}}$

Polynomial Division

Use long division to divide the following expressions.

43) $\frac{x^3+3x-4}{x-2}$ 44) $\frac{x^3-3x^2+4}{x+3}$