Date: June 2022

Dear AP Student:

Welcome to Advanced Placement Calculus. The Advanced Placement curriculum reflects college-level analysis. Additional skills that will be covered in this course as outlined by College Board, is that students will build their "understanding of differential and integral calculus through engaging with real-world problems represented graphically, numerically, analytically, and verbally and using definitions and theorems to build arguments and justify conclusions as they explore concepts like change, limits, and the analysis of functions". This course will require students to participate verbally. Students enrolled in an AP course are expected to keep up with the academic rigor involved and spend at least 15 hours on assigned work/review weekly.

By taking this advanced course, you have agreed to engage in summer work. *Summer work will be due the first week of school.* It is recommended that you pace yourself with the workload so that you can enjoy and process the materials.. Taking time to conduct the summer work will facilitate your understanding and better prepare you for the content covered in August.

You can access all this information on the Islamic Foundation School website. Go to, then click on "Student Life" (top right), then select "AP Summer Work" from the menu. A list of all AP courses will be displayed. Select the course that you are enrolled in.

Summer Work:

Textbook/Reading: Calculus: Graphical, Numerical, Algebraic, AP* Edition, by Demana, Waits, Kennedy, Bressoud, and Boardman, 6th ed, 2020. (ISBN13: 9781418300203).
You can buy a used copy of this book cheaply.

Directions: (see below)

Please review the IFS Academic Integrity Policy as listed in the Parent/Student Handbook on the school website. As society becomes more reliant on technology, IFS teachers have seen a notable increase in plagiarism, including students claiming material from online sources and/or claiming the work of past and present peers as their own original ideas. Due to this, we want to be sure that each student understands the seriousness of this offense and request that you sign and date the policy (see below) and return it to your AP teacher during the first week of class.
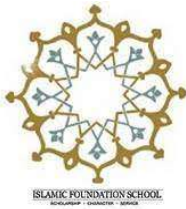
We look forward to having you join us in the upcoming school year,

Sincerely,

Idris Ibrahim
Math and Science
iibrahim@ifsvp.org

_____

Academic Integrity Agreement:

I acknowledge that I have read the Academic Integrity Agreement entailing the Student Code of Conduct and Honor Code as identified in the Parent/Student Handbook and I will adhere to these policies and procedures while enrolled at Islamic Foundation School.

ISLAMIC FOUNDATION SCHOOL
Scholarship - Character - Service
300 W. Highridge Rd. - Villa Park, IL 60181
Phone: 630-941-8800 Fax: 630-941-0114

Student Signature: _____ Date: _____

بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ ٱلرَّحِيمِ

The AP Calculus Summer Work Recommendations

As-salaamu alaykum wa rahmatu Allahi wa barakatuh.
It is essential that you are determined to work hard if you wish to take calculus.

Calculus AB is a course in single-variable calculus that includes limits of functions, techniques and applications of the derivative, Fundamental Theorem of Calculus, and techniques and applications of the definite integral. It is equivalent to at least a semester of calculus at most colleges and universities.

Review of precalculus: To help you get ready and have a good start it is recommended that you review precalculus lessons during this summer break. Chapter 1 of the calculus textbook is dedicated to precalculus review. Calculus book chapter 1 in pdf format is attached. You may use this file or get a Calculus textbook from the school.

Qualifying test: In the first week of school in Fall there will (in sha Allah) be a qualifying test based on precalculus. The overview of precalculus is calculus textbook chapter 1 (attached). So, revise precalculus. You must pass this test to be in the calculus class. If you have questions you may email me at iibrahim@ifsvp.org.
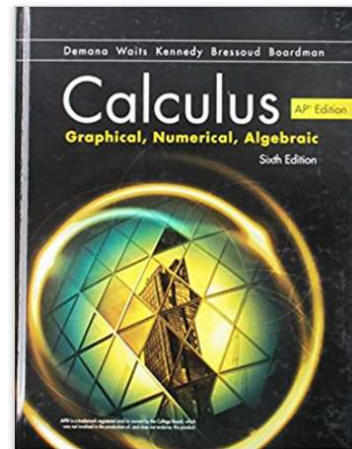
The Princeton Review: Please, buy yourself a copy of The Princeton Review AP-Calculus AB & BC, any Edition.

Relax with Dhikrullah: It is also essential that you come relaxed but poised ready to fly. So, have an enjoyable summer and don't lose focus on Allah ta'ala and the ways of approach to Him.

Wa alaykum ssalaamu wa rahmatu Allahi wa barakatuh.

IAI.

Text book:

ISBN-13: 978-1418300203
ISBN-10: 1418300209

Calculus: Graphical, Numerical, Algebraic, AP* Edition, by Demana, Waits, Kennedy, Bressoud, and Boardman, 6th ed, 2020. (ISBN13: 9781418300203).

You can buy a used copy of this book cheaply.

Calculus AP Summer Work

The following is recommended to be done over the summer in preparation for AP Calculus class:

Summer Assignments:
1. Calculus Textbook Chapter 1: **Precalculus** review chapter.

   https://drive.google.com/file/d/1KocNpT7Da0EkwNWt62ODYUXnU6rU1JDT/view?usp=sharing

Study and do the exercises questions listed below (all sections to be studied with the assignments as listed in the table below from the exercise pages of each section.)

Sec. 1: Lines (AB & BC students)	Odds between 41 - 51
Sec. 2: Functions-graphs (AB & BC)	Odds between 31-33, 41-53
Sec. 3: Exponential Fns (AB & BC)	Odds between 9-1821-29, 41-47
Sec. 4: Parametric Fns (BC only)	Odds between 1-15, 37-41
Sec. 5: Logarithms (AB & BC)	Odds between 7-11, 15-23, 37-47, 53-57
Sec. 6: Trigono Fns (AB & BC)	Odds between 1-15, 27-29, 31-39, 51-55

2. Review Rational functions. Chapter 7 of **Algebra2** textbook may be helpful:

BIG IDEAS MATH Algebra 2: Student Edition 2019 by Houghton Mifflin Harcourt, Laurie Boswell, Ron Larson

If you don't have a textbook, the following link may be used: https://bim.easyaccessmaterials.com/?level=13.00&p=chapter 7
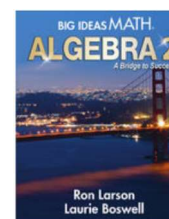
3. Chapter test-: You must do the practice tests A and B (see below: pg. 4 and 7). Detail work must be submitted on the first day of class. I'll recommend you do them in the last week of your summer break.

More notes:

1. You may have to take a qualifying test into calculus. The following link for precalculus study guide may help. https://drive.google.com/file/d/1Yqv8jnoqATtPp3snHtI4OeksTlJDWR_g/view?usp=sharing.

2. You may study chapter 11 of Precalculus textbook: "Limits and an Introduction to Calculus". This is optional but helpful towards calculus chap. 2.

https://drive.google.com/file/d/1grDIRI3Mm3QcC_dEq5kyFs804yMHQBnT/view?usp=sharing

|	**Check list**	
1.	Calculus Textbook Chapter 1 - Homework Sec. 1: (Odds between 41 – 51)	
2.	Calculus Textbook Chapter 1 - Homework Sec. 2	
3.	Calculus Textbook Chapter 1 - Homework Sec. 3	
4.	Calculus Textbook Chapter 1 - Homework Sec. 4	
5.	Calculus Textbook Chapter 1 - Homework Sec. 5 (BC students only)	
6.	Calculus Textbook Chapter 1 - Homework Sec. 6	
7.	Rational functions. Chapter 7 of algebra2 textbook	
8.	Chapter one pretests A	
9.	Chapter one pretests B	
10.	Chapter 11 of Precalculus textbook (Optional)	
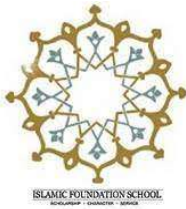
CALCULUS Chapter 1 Practice Test – A Name: _____ Date_____

1. If L is the line $y = -\frac{3}{4}x - 2$
   (a) write an equation for the line through a point (-2, 2) perpendicular to L _____

   (b) Write an equation for the line through points (2, -2) and (-2, 0) _____

3. If $f(x) = \begin{cases} x^2 - 2, & x \le 1 \\ 2x, & x > 1 \end{cases}$

   (a) Draw the graph of $f(x)$
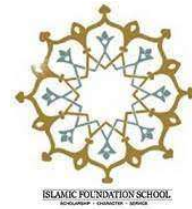   (b) Find the domain_____
   (c) Find the range _____
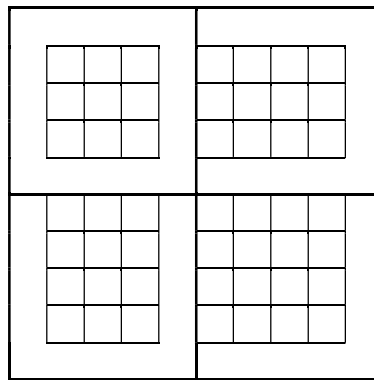
2. For the function $y = \sqrt{x^2 - 4} + 6$, find
   (a) the domain,   _____
   (b) the range,   _____
   (c) if the function is even, odd, or neither

   _____

4. If $f(x) = 2x^3$ and $g(x) = \dfrac{1}{2-x}$,

   find (a) $f \circ g$ _____
   domain: _____
   range: _____

   (b) $g \circ f$ _____
   domain: _____
   range   _____

5. Use a graph to solve the equation: $15 - 2^{-x} = 0$
   (Calculator allowed. Show its sketch)

8. Let $y = 2\cos\left(\dfrac{3x}{2} + \pi\right) - 3$. Determine the function's
   (a) period, _____
   (b) domain _____
   (c) range. _____

6. If the population of certain species grows by 2.5% yearly from 200 in how many years will the population be 75000. _____

9. Solve the equation $\csc x = -2$ in the interval $0 \le x \le 2\pi$ _____

7. If $f(x) = \sqrt{4-x}$, find an expression for $f^{-1}(x)$. State any necessary domain restrictions.

10. Solve the equation $\csc x = -3$ in the interval $0 \le x \le 2\pi$ _____
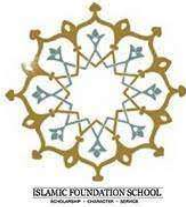
Ans.:

1. (a) $y = \frac{4}{3}x + \frac{14}{3}$ (b) $y = -\frac{1}{2}x - 1$

2. (a) D: $(-\infty, -2] \cup [2, \infty)$, (b) R: $[6, \infty)$ (c) even

3. (a)   (b) $(-\infty, \infty)$ (c) R: $[-2, \infty)$

4. (a) $f \circ g = \frac{2}{(2-x)^3}$, D: $x \neq 2$, R: $y \neq 0$ (b) $g \circ f = \frac{2}{2(1-x^3)}$, D: $x \neq 1$, R: $y \neq 0$

5.

6. $p = 200(1+0.025)^t = 75000 \quad \Box \quad t = \frac{\log(375)}{\log(1.0.25)} = 240$

7. $f^{-1}(x) = 4 - x^2 . \quad x \geq 0$

8. Let $y = 2\cos\left(\frac{3x}{2} + \pi\right) - 3$. (a) period, ___$4\pi/3$___ (b) domain: $(-\infty, \infty)$ range. $(-1, -5)$

9. $x_{ref} = \frac{\pi}{6}$, $x = \pi + \frac{\pi}{6} = \frac{7\pi}{6}$, $x = 2\pi - \frac{\pi}{6} = \frac{11\pi}{6}$

10.

___
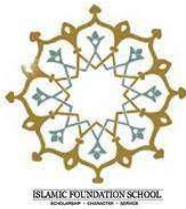
**Calculus:** Chapter 1 Practice Test B

Name: _____ **Date:** _____.

To be done after the review study in preparation for a qualifier test in the first week of school
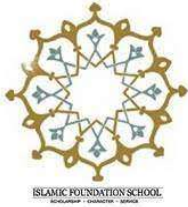
1. Find an equation of the vertical line passing through (2, -6).

   (a) $y = -6x$ **(b)** $y = 2x$ **(c)** $x = 2$ **(d)** $y = -6$ **(e)** None of these

2. Find an equation of the line passing through (2, -6) parallel to the line $2x - 3y = 4$.

   (a) $y = \frac{3}{2}x - 3$ **(b)** $y = -\frac{2}{3}x - 3$ **(c)** $y = -\frac{3}{2}x - 3$ **(d)** $y = \frac{3}{2}x + 3$ **(e)** None of these

3. Find an equation of the line passing through (2, -6) perpendicular to the line $2x - 3y = 4$.

   (a) $y = \frac{3}{2}x - 3$ **(b)** $y = -\frac{2}{3}x - 3$ **(c)** $y = -\frac{3}{2}x - 3$ **(d)** $y = \frac{3}{2}x + 3$ **(e)** None of these

4. Determine if the function is even or odd or neither $y = x - x^3 + x^5$.
   (a) even   **(b)** odd   **(c)** neither

5. Determine if the function is even or odd or neither $y = x^2 + \cos x$.
   (a) even   **(b)** odd   **(c)** neither

6. The domain of $y = \sqrt{16 - x^2}$

   (a) $x \neq 16$ **(b)** $x < 16$ **(c)** $(-\infty, -4)U(4, \infty)$ **(d)** $[-4, 4]$ **(e)** None of these

7. The domain of $y = 3e^{-x} + 2$

   (a) $(-\infty, \infty)$ **(b)** $[2, \infty)$ **(c)** $(-\infty, -2)U(2, \infty)$ **(d)** $(-\infty, 2]$ **(e)** None of these

8. The range of $y = 3e^{-x} + 2$

   (a) $(-\infty, \infty)$ **(b)** $(2, \infty)$ **(c)** $(-\infty, -2)U(2, \infty)$ **(d)** $(-\infty, 2]$ **(e)** None of these
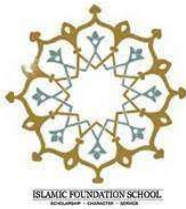
9. The range of $y = |x - 1| - 3$

(a) $(-\infty,\infty)$　　**(b)** $[-3,\infty)$　　**(c)** $(-\infty,-3)U(3,\infty)$　**(d)** $[-1,1]$　　**(e)** None of these

10. The domain of $y = \cos x + 2$

(a) $(-\infty,\infty)$　　**(b)** $[2,\infty)$　　**(c)** $[1,3]$　　**(d)** $[-1,1]$　　**(e)** None of these

11. The range of $y = \cos x + 2$

(a) $(-\infty,\infty)$　　**(b)** $[2,\infty)$　　**(c)** $[1,3]$　　**(d)** $[-1,1]$　　**(e)** None of these

12. If $f(x) = x^2 + 3$ and $g(x) = \dfrac{1}{\sqrt{x-1}}$, find $(f \circ g)(-1)$.

(a) 3/2　　**(b)** 0　　**(c)** 5/2　　**(d)** undefined　　**(e)** None of these

13. If $f(x) = x^2 + 3$ and $g(x) = \dfrac{1}{\sqrt{x-1}}$, find $(f \circ g)(x)$.

(a) $\dfrac{1}{\sqrt{x^2+2}}$　　**(b)** $\dfrac{3x-2}{x-1}$　　**(c)** $\dfrac{x^2+3}{\sqrt{x-1}}$　　**(d)** $\dfrac{1}{\sqrt{x^2-1}}$　　**(e)** None of these

14. If $f(x) = x^2 + 3$ and $g(x) = \dfrac{1}{\sqrt{x-1}}$, the domain of $(f \circ g)(x)$ is

(a) $(-\infty,\infty)$　　**(b)** $[1,\infty)$　　**(c)** $(1,\infty)$　　**(d)** $(0,\infty)$　　**(e)** None of these

15. If $f(x) = x^2 + 3$ and $g(x) = \dfrac{1}{\sqrt{x-1}}$, the range of $(f \circ g)(x)$ is

(a) $(-\infty,\infty)$　　**(b)** $[1,\infty)$　　**(c)** $(1,\infty)$　　**(d)** $(-\infty,3) \cup (3,\infty)$　　**(e)** None of these

16. Solve for x:　$\log x + \log(x+3) = 1$

(a) 2　　**(b)** 3　　**(c)** 4　　**(d)** -1　　**(e)** None of these

17. Solve for x: $25^{x-2} = 5^{3x}$

(a) - 4　　**(b)** 5　　**(c)** -5　　**(d)** 3　　**(e)** None of these

8/10
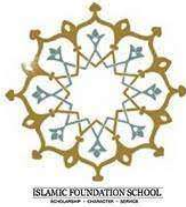
18. A certain population increases according to the model $P(t) = 40e^{0.025t}$. Determine the initial population

and the population (to the nearest integer) when $t = 50$, round your answer to the nearest integer
  (a) 40, 140   (b) 0, 50   (c) 0.25, 50   (d) 40, 50   (e) None of these

19. The period of the function given by $y = -\frac{4}{3}\cos\left(\frac{3x}{2} - \frac{1}{2}\right)$ is

  (a) 6π (b) $\frac{4\pi}{3}$ (c) $\frac{4}{3}$ (d) $\frac{1}{2}$ (e) None of these

20. Which of the following is a vertical \asymptote to the graph of $y = \csc 3x$?

  (a) $x = \frac{\pi}{2}$ (b) $x = \frac{3\pi}{2}$ (c) $x = \frac{\pi}{3}$ (d) $x = \frac{\pi}{4}$ (e) None of these

Test -B Key:

1	c	8	b	15	d
2	e	9	b	16	a
3	c	10	a	17	a
4	b	11	c	18	a
5	a	12	d	19	b
6	d	13	b	20	c
7	a	14	c		