# AP Summer Assignment

**Course: Advanced Placement Calculus BC**

<table>
<thead>
<tr>
<th>Assignment title</th>
<th>Summer Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date due</td>
<td>The first day of class.</td>
</tr>
<tr>
<td>Estimated time for completion</td>
<td>6-8 hours</td>
</tr>
</tbody>
</table>
| Resources needed to complete assignment | □ Textbook assigned by school  
□ Book(s) supplied by student  
☒ Other supplies: Problems 1-20 and answer sheet attached |
| How the assignment will be assessed | Assignment will count as a test grade. Assignment must be completed independently. |
| Purpose of assignment  | ☒ Review foundational material/concepts/skills.  
□ Expose students to required material/concepts/skills/texts that cannot entirely be covered during the academic year.  
□ Have students read material that will be discussed or used in class at the beginning of the year. |
AP Calculus BC Summer Packet Exercises

These exercises represent some of the more fundamental concepts that you are expected to know from Analysis as you enter AP Calculus BC. As you work on these problems, you might encounter concepts that you have forgotten. There are many resources available (Internet, books, etc.) that you can use to get help.

These exercises are expected to be completed and are due the first day of class.

1. Find the equation of the line that passes through (2, -1) and is perpendicular to the line $2x - 3y = 5$.

2. Graph without a calculator:
   
   a) $y = (x - 3)^2 + 2$
   b) $y = (x + 1)^3$
   c) $y = 2 - \sqrt{x}$
   d) $y = e^{-x}$
   e) $y = \ln(x - 1)$
   f) $y = \sqrt{1-x}$
   g) $y = 2\sin x$
   h) $y = \cos \pi x$
   i) $y = \tan x + 1$
   j) $y = 2|x - 3|$
   k) $y = \frac{1}{x + 1}$

3. Graph and label all asymptotes of $y = \frac{2x}{x - 4}$.

4. Graph $(x - 2)^2 + y^2 = 5$ and $(y + 2)^2 - x^2 = 16$.

5. Which relations are functions?

   a) $xy = 3$
   b) $\sqrt{y} = 2x$
   c) $xy^2 = 7$
   d) $x + 3y = 5$
   e) $x^2 + (y - 2)^2 = 4$
   f) $\frac{1}{x} + 2y = 9$
   g) $y^2 = x^2 + 3$

6. Find the domain, range, and inverse of the graph.
7. If \( f(x) = \frac{x}{x-1} \) and \( g(x) = \frac{1}{x-1} \), find \( (f \circ g)(x) \).

8. Solve the following.
   a) \( 4t^3 - 12t^2 + 8t = 0 \)
   b) \( 3\sqrt{x-2} - 8 = 8 \)
   c) \( 2\ln 3x = 4 \)
   d) \( \frac{x-5}{3-x} \geq 0 \)
   e) \( \left| 2 - \frac{x}{3} \right| < 5 \)
   f) \( 4e^{2x} = 5 \)
   g) \( (x - 4) - 5(x - 4)^x = 6 \)
   h) \( 2\sin^2 x = \sin x + 1; 0 \leq x \leq 2\pi \)

9. Solve algebraically \( \begin{cases} 5a + 3b = 9 \\ 2a - 4b = 14 \end{cases} \)

10. Solve using matrices \( \begin{align*}
    x + 4z &= 13 \\
    4x - 2y + z &= 6 \\
    2x - 2y + 7z &= 10
\end{align*} \)

11. Factor \( \begin{cases} a) 3x^3 + 192 \\ b) 2x^3 - 11x^2 + 12x + 9 \\ c) 2x^2 + x^2 - 15x + x \\ d) 9x^2 - 3x - 2 \end{cases} \)

12. Simplify the following.
   a) \( 2\ln(x - 3) + \ln(x + 2) - 6\ln x \)
   b) \( \frac{2}{x - 3} \)
   c) \( x(1 - 2x)^{-x} + (1 - 2x)^{-x} \)

13. Suppose \( A = \begin{bmatrix} 2 & 3 & 6 \\ 4 & -2 & 0 \end{bmatrix} \) and \( B = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 2 & 1 & 0 \end{bmatrix} \). Find \( 2A \times B \) and \( 2B \times A \).

14. Simplify \( \begin{cases} a) i^{27} \\ b) (7 + 3i)(5 - i) \end{cases} \)
15. Find the distance between \( \left( \frac{1}{2}, -7 \right) \) and \((-3, 4)\).

16. Find each summation. 
   a) \( \sum_{i=1}^{n} \left( \frac{1}{2} \right)^{i-1} \)  
   b) \( \sum_{i=1}^{n} (i^2 - 3i + 2) \)

17. Find the area and perimeter (or circumference) of each figure. 
   a)  
   
   b)  
   
   c)  

18. Find \( x \). 

19. Find the following. 
   a) \( \sin \frac{7\pi}{6} \)  
   b) \( \cos 120^\circ \)  
   c) \( \tan \frac{\pi}{2} \)  
   d) \( \csc 60^\circ \)  
   e) \( \sec \left( -\frac{2\pi}{3} \right) \)  
   f) \( \cot (-135^\circ) \)

20. Simplify. 
   a) \( 4\sin 2x \cos 2x \)  
   b) \( 1 - \sec^2 x \)  
   c) \( \frac{1 + \cos 2x}{2} \)  
   d) \( \cos^2 x - \sin^2 x \)  
   e) \( \cos^2 x + \sin^2 x \)
1.

2. a  b  c  d  e  f  g  h  i  j  k

3.

4.

5  a  b  c  d
   e  f  g
6. Domain ___________________ Inverse
    Range ___________________

7. 

8. a ___________ b ___________ c ___________
    d ___________ e ___________ f ___________
    g ___________ h ___________

9. 

10. 

11. a ________________ b ________________
    c ________________ d ________________

12. a ________________ b ________________ c ________________
13. \[ 2A \times B \quad 2B \times A. \]

14. a \_

15. 

16. a \_

17. a \_

18. 

19. a \_

20. a \_