

## AP Calculus AB – Unit 1 Outline – Review and Foundations

<b>Monday 8/12</b>	<b>Today's Topic: Welcome to AP Calculus AB</b>
Today, we will discuss our class expectations.	
<b>Homework:</b> Make sure you have the necessary materials for this class.	

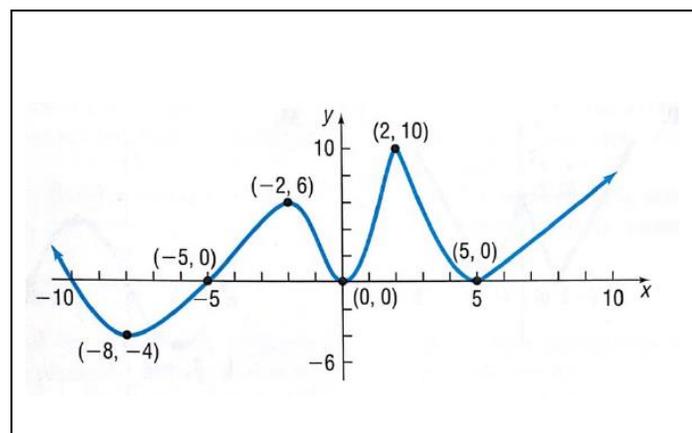
<b>Tuesday 8/13</b>	<b>Today's Topic: Linear Functions</b> <ol style="list-style-type: none"> <li>1. Find the slope of a line given two points.</li> <li>2. Write an equation of a line.</li> <li>3. Relationship between the slopes of parallel and perpendicular lines.</li> </ol>
<b>In-class examples:</b>	
<b>Ex.1</b> Write the equation for the line ( <b>point-slope form</b> ) through the point $(2,3)$ with slope $-\frac{3}{2}$ .	
<b>Ex. 2</b> Write the equation for the line ( <b>point-slope form</b> ) through $(-2,-1)$ and $(3,-4)$ .	
<b>Ex. 3</b> Write an equation for the line ( <b>point-slope form</b> ) through the point $(1,5)$ that is <ol style="list-style-type: none"> <li>a) parallel to <math>2x + y = 4</math></li> <li>b) perpendicular to <math>2x + y = 4</math></li> </ol>	
<b>Homework:</b> Worksheet 1	

<b>Wednesday 8/14</b>	<b>Today's Topic: Algebraic and Numeric Representations of Functions</b>														
<b>In-class examples:</b>															
<b>Algebraic:</b>															
<b>Ex. 1</b> If $f(x) = x^2 - 4x + 7$ , evaluate: <ol style="list-style-type: none"> <li>a) <math>f(3a)</math></li> <li>b) <math>f(x+h)</math></li> <li>c) <math>f(x+h) - f(x)</math></li> <li>d) <math>\frac{f(x+h) - f(x)}{h}</math></li> </ol>															
<b>Ex. 2</b> Evaluate $y = \cos x$ when $x = \frac{\pi}{6}$ .															
<b>Ex. 3</b> Given $f(x) = x + 5$ and $g(x) = x^2 - 3$ , find: <ol style="list-style-type: none"> <li>a) <math>f(g(x))</math></li> <li>b) <math>g(f(x))</math></li> <li>c) <math>g(g(x))</math></li> </ol>															
<b>Ex. 4</b> Piecewise Defined Function: $f(x) = \begin{cases} 2x+1, & x \leq 0 \\ \sin x, & x > 0 \end{cases}$ , evaluate: <ol style="list-style-type: none"> <li>a) <math>f(-4)</math></li> <li>b) <math>f(0)</math></li> <li>c) <math>f(\pi)</math></li> </ol>															
<b>Numeric:</b>															
<b>Ex. 5</b> $f(x)$ is a continuous function with domain all real numbers. Selected values of $f(x)$ are given in the table below: <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 5px;"><math>x</math></td> <td style="padding: 5px;">-4</td> <td style="padding: 5px;">-1</td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">5</td> <td style="padding: 5px;">8</td> <td style="padding: 5px;">11</td> </tr> <tr> <td style="padding: 5px;"><math>f(x)</math></td> <td style="padding: 5px;">-5</td> <td style="padding: 5px;">2</td> <td style="padding: 5px;">4</td> <td style="padding: 5px;">-1</td> <td style="padding: 5px;">1</td> <td style="padding: 5px;">6</td> </tr> </table> <ol style="list-style-type: none"> <li>a) What is the least number of times for which the graph of <math>f(x)</math> crosses the <math>x</math>-axis? Explain your reasoning.</li> <li>b) Evaluate <math>\frac{f(11) - f(-4)}{11 - (-4)}</math> ...we will use this formula a lot this year.</li> </ol>		$x$	-4	-1	2	5	8	11	$f(x)$	-5	2	4	-1	1	6
$x$	-4	-1	2	5	8	11									
$f(x)$	-5	2	4	-1	1	6									
<b>Homework:</b> Worksheet 2															

Thursday 8/15

Today's Topic: Functions – Graphical Representation

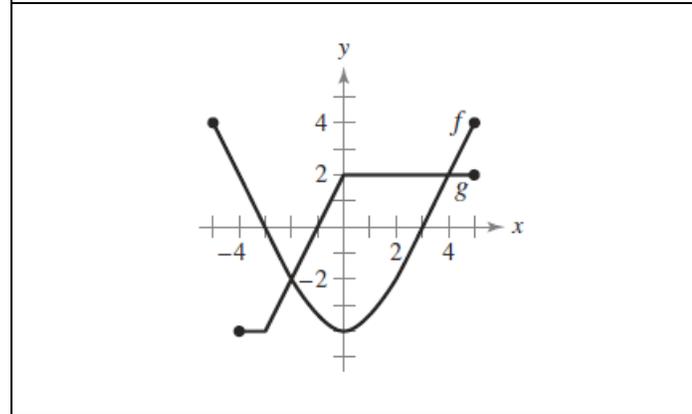
In-class examples:



**Ex. 1**

The graph of a function,  $f(x)$ , is shown at left. Answer the following questions.

- Determine  $f(0)$  and  $f(2)$ ?
- Is  $f(-6)$  positive or negative? Explain your reasoning.
- On what interval(s) is  $f(x)$  increasing? Explain.
- For which  $x$ -values does  $f(x) = 0$ ?
- For how many  $x$ -values does  $f(x) = 4$ ? Explain.
- Find the average rate of change of  $f(x)$  on  $[-8, 2]$ .



**Ex. 2**

Use the graphs of  $f$  and  $g$  to answer the following questions:

- Evaluate  $g(f(3))$ .
- For what value(s) of  $x$  does  $f(x) = g(x)$ ?
- For what value(s) of  $x$  is  $f(x) > g(x)$ ?

**Homework:** Worksheet 3

Friday 8/16

Today's Topic: Graphing Calculator Basics

In-class examples:

 **Ex. 1** Consider the following function:  $f(x) = x^3 - 4x^2 - x + 5$

- Graph  $f(x)$
- Evaluate  $f(3)$ ;  $f(3.21)$ ;  $f\left(-\frac{2}{7}\right)$
- Find all the zeroes of  $f(x)$
- Find the coordinates of the maximum points.
- Find the coordinates of the minimum points.

 **Ex. 2** Given  $f(x) = x^3 - 4x^2 - x + 5$  and  $g(x) = 2x - 1$ . Find all values of  $x$ , such that  $f(x) = g(x)$ .

**Homework:** Worksheet 4

<b>Monday 8/19</b>	<b>Today's Topic:</b> Solving Equations
<b>In-class examples:</b>	
<b>Ex. 1</b> Find the zeroes of $f(x) = 3x^2 - 5x + 2$	
<b>Ex. 2</b> Find the zeroes of $f(x) = e^{x-3} - 4$	
<b>Ex. 3</b> Find the zeroes of $f(x) = \cos 2x$ in $[0, 2\pi)$ .	
<b>Ex. 4</b> Find the zeroes of $f(x) = \ln x - 3$	
<b>Homework:</b> Worksheet 5	

<b>Tuesday 8/20</b>	<b>Today's Topic:</b> Intro to Calculus: Approximating Slope and Area														
<b>In-class Examples:</b>															
<b>Ex. 1</b> The graph of $f(x)$ is shown in the figure below.															
a) Use the graph to estimate the slope of $f(x)$ at the precise moment that $x = 2$ .															
b) Estimate the area above the $x$ -axis and under the graph of $f(x)$ on the interval $[1,4]$ .															
<b>Ex. 2</b> Given $f(x) = x^2 + 7$ :															
a) approximate the slope of the curve when $x = 3$ .															
b) estimate the area above the $x$ -axis and under the graph of $f(x)$ on the interval $[2,5]$ .															
<b>Ex. 3</b> $f(x)$ is a continuous function with domain all real numbers. Selected values of $f(x)$ are given in the table below:															
<table border="1"> <tr> <td><math>x</math></td> <td>-4</td> <td>-1</td> <td>2</td> <td>5</td> <td>8</td> <td>11</td> </tr> <tr> <td><math>f(x)</math></td> <td>-5</td> <td>2</td> <td>4</td> <td>-1</td> <td>1</td> <td>6</td> </tr> </table>		$x$	-4	-1	2	5	8	11	$f(x)$	-5	2	4	-1	1	6
$x$	-4	-1	2	5	8	11									
$f(x)$	-5	2	4	-1	1	6									
a) Approximate the slope of $f(x)$ when $x = 6$ .															
b) Approximate the area between the $x$ -axis and the graph of $f(x)$ when $[-1,8]$ .															
<b>Homework:</b> Worksheet 6															

<b>Wednesday 8/21</b>	<b>Today's Topic:</b> Review
<b>In-class examples:</b> None	
<b>Homework:</b> Unit 1 Review	

<b>Thursday 8/22</b>	<b>Today's Topic:</b> Exam
<b>In-Class Example:</b> None	
<b>Homework:</b> Be sure to bring your calculator to school tomorrow!	