PreCalculus Honors Summer Assignment – Kimball High School 2018

This assignment is designed to make the transition to PreCalculus Honors a smooth one. You will be practicing skills you have acquired in earlier math classes. The assignment is also designed to familiarize you with the graphing utilities we will use (both calculators and computer software). The entire assignment is due on the first day of class. There will be a test on this material during the first week of school in the Fall. **Be sure to read the Hints Page** and use the old PreCalculus textbook for reference. The hints page will be posted on Mr. Medek's website: https://www.tracy.k12.ca.us/sites/dmedek/Pages/default.aspx . You can access the old text by clicking on this link: OLD PreCalculus With Limits text, Chapter P

Directions: In order to receive credit all work must be completed in pencil. Remember that we care about process, so show your work carefully **on graph paper**. Include all work together with the graph, when a graph is required. This should include: problem numbers, calculations done neatly, sketches drawn carefully, and labeled answers (circled, underlined, or boxed). Organize your work into columns and work down, not across the paper.

In exercises 1-4, plot the point and determine the quadrant in which it is located.

1. (8, –3)
2. (–4, –9)
3. $\left(-\frac{5}{2},10\right)$
4. (–6.5, –0.5)

In exercises 5 and 6, determine the quadrant(s) in which (x, y) is located so that the conditions are satisfied.

5. x > 0 and y = –2
6. The point (x, y) such that $xy = 4$

7. ***Patents*** The number of patents *P* (in thousands) issued in the United States from 1988 through 1996 is shown on the table.

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996
P	84.4	102.7	99.2	106.8	107.4	109.7	113.6	113.8	121.7

a. Sketch a scatter plot of the data.
b. What statement can be made about the number of patents issued in the United States?

8. ***Business*** The net profits (in millions of dollars) for the Progressive Corporation for the years 1994 through 1998 are shown in the table. Create a bar graph and a separate line graph for the data.

Year	1994	1995	1996	1997	1998
Profits	228.1	250.2	316.6	400.0	456.7

In exercises 9 and 10, plot the points and find the distance between the points.

9. $(-3,8),(1,5)$
10. $(5.6,0),(0,8.2)$

Geometry **In exercises 11 and 12, plot the points and verify [prove] that the points form the polygon. Begin by writing the definition of the polygon.**

11. *Right Triangle:* $(2,3),(13,11),(5,22)$
12. *Parallelogram*: $(1,2),(8,3),(9,6),(2,5)$

In exercises 13 and 14, plot the points and find the midpoint of the line segment joining the points.

13. $(-12,5),(4,-7)$
14. $(1.8,7.4),(-0.6,-14.5)$

15. ***Business*** The Sbarro restaurant chain had revenues of $329.5 million in 1996 and $375.2 million in 1998.
(a) Without any additional information, what would you estimate the 1997 revenues to have been?
(b) The actual revenue for 1997 was $349.4 million. How accurate is your estimate?

In exercises 16 and 17, find the standard form of the equation of the specified circle.

16. Center: (3, -1) Solution point: (-5, 1)
17. End points of the diameter: (-4, 6), (10, -2)

In exercises 18 and 19, complete the table. Use the resulting solution points to sketch the graph of the equation.

18. $y = -\frac{1}{2}x + 2$

x	-2	0	2	3	4
y					

19. $y = x^2 - 3x$

x	-2	0	2	3	4
y					

In exercises 20-29, sketch the graph of the equation *by hand*.

20. $y-2x-3=0$
21. $3x+2y+6=0$
22. $x-5=0$
23. $y=8-|x|$
24. $y=\sqrt{5-x}$
25. $y=\sqrt{x+2}$
26. $y+2x^2=0$
27. $y=x^2-4x$
28. $x+y^2=9$
29. $x^2+y^2=10$

In exercises 30-37,use a graphing utility to graph the equation. Approximate any intercepts.

30. $y=\frac{1}{4}(x+1)^3$
31. $y=4-(x-4)^2$
32. $y=\frac{1}{4}x^4-2x^2$
33. $y=\frac{1}{4}x^3-3x$
34. $y=x\sqrt{9-x^2}$
35. $y=x\sqrt{x+3}$
36. $y=|x-4|-4$
37. $y=|x+2|+|3-x|$

In exercises 39-44, plot the two points and find the slope of the line that passes through the two points.

39. (-3, 2), (8, 2)	40. (7, -1), (7, 12)	41. $(\frac{3}{2},1)$, $(5,\frac{5}{2})$	42. $(-\frac{3}{4},\frac{5}{6})$, $(\frac{1}{2},-\frac{5}{2})$
43. $(-4.5,6)$, $(2.1,3)$		44. $(-2.7,-6.3)$, $(-1,-1.2)$	

In exercises 45-48, use the concept of slope to find *t* such that the three points are collinear.

45. $(-2,5),(0,t),(1,1)$
46. $(-6,1),(1,t),(10,5)$
47. $(1,-4),(t,3),(5,10)$
48. $(-3,3),(t,-1),(8,6)$

In exercises 49-58, (a) find an equation of the line that passes through the given point and has the specified slope, and (b) find three additional points through which the line passes.

	Point	*Slope*		*Point*	*Slope*
49.	(2, -1)	$m=\frac{1}{4}$	50.	(-3, 5)	$m=-\frac{3}{2}$
51.	(0, -5)	$m=\frac{3}{2}$	52.	(3, 0)	$m=-\frac{2}{3}$
53.	$(\frac{1}{5},-5)$	$m=-1$	54.	$(0,\frac{7}{8})$	$m=-4$
55.	$(-2,6)$	$m=0$	56.	$(-8,8)$	$m=0$
57.	$(10,-6)$	m is undefined	58.	(5, 4)	m is undefined

In exercises 59-64, (a) find an equation of the line (in slope-intercept form) that passes through the points and (b) sketch the graph of the equation.

59. $(2,-1)$ $(4,-1)$
60. $(0,0)$ $(0,10)$
61. $(2,1)$ $(14,6)$
62. $(-2,2)$ $(3,-10)$
63. $(-1,0)$ $(6,2)$
64. $(1,6)$ $(4,2)$

In exercises 65-68, write equations of the lines through the point (a) parallel to the given line and (b) perpendicular to the given line.

	Point	*Line*		*Point*	*Line*
65.	(3, -2)	$5x-4y=8$	66.	(-8, 3)	$2x+3y=5$
67.	(-6, 2)	x = 4	68.	(3, -4)	y = 2

In exercises 69-72, solve the equation (if possible) and use a graphing utility to verify your solution.

69. $14+\frac{2}{x-1}=10$
70. $6-\frac{11}{x}=3+\frac{7}{x}$
71. $\frac{9x}{3x-1}-\frac{4}{3x+1}=3$
72. $\frac{5}{x-5}+\frac{1}{x+5}=\frac{2}{x^2-25}$

In exercises 73-76, determine the x- and y-intercept of the graph of the equation algebraically. Use a graphing utility to verify your answer.

73. $-x+y=3$
74. $x-5y=20$
75. $y=x^2-9x+8$
76. $y=25-x^2$

In exercises 77 and 78, use a graphing utility to graph the equation and approximate the x- and y-intercepts.

77. $y = -|x+5| - 2$

78. $y = 6 - 2|x-3|$

In exercises 79-84, use a graphing utility to approximate any solutions (accurate to three decimal places) of the equation.

79. $5(x-2) - 1 = 0$

80. $12 - 5(x-7) = 0$

81. $3x^3 - 2x + 4 = 0$

82. $\frac{1}{3}x^3 - x + 4 = 0$

83. $x^4 - 3x + 1 = 0$

84. $6 - \frac{1}{2}x^2 + \frac{5}{6}x^4 = 0$

In exercises 85-88, determine algebraically any points of intersection of the graphs of the equations. Use a graphing utility to verify your answer(s).

85. $\begin{aligned} 3x + 5y &= -7 \\ -x - 2y &= 3 \end{aligned}$

86. $\begin{aligned} x - y &= 3 \\ 2x + y &= 12 \end{aligned}$

87. $\begin{aligned} x^2 + 2y &= 14 \\ 3x + 4y &= 1 \end{aligned}$

88. $\begin{aligned} y &= -x + 7 \\ y &= 2x^3 - x + 9 \end{aligned}$

In exercises 89-98, use any method to solve the equation. Use a graphing utility to verify your solution(s).

89. $6x = 3x^2$

90. $15 + x - 2x^2 = 0$

91. $(x+4)^2 = 18$

92. $16x^2 = 25$

93. $x^2 - 12x + 30 = 0$

94. $x^2 + 6x - 3 = 0$

95. $2x^2 + 9x - 5 = 0$

96. $-x^2 - x + 15 = 0$

97. $x^2 - 4x - 10 = 0$

98. $-2x^2 - 13x = 0$

In exercises 99-116, solve the equation (if possible) and use a graphing utility to verify your solution.

99. $3x^3 - 26x^2 + 16x = 0$

100. $216x^4 - x = 0$

101. $5x^4 - 12x^3 = 0$

102. $4x^3 - 6x^2 = 0$

103. $\sqrt{x+4} = 3$

104. $\sqrt{x-2} - 8 = 0$

107. $(x-1)^{2/3} - 25 = 0$

108. $(x+2)^{3/4} = 27$

109. $3\left(1 - \frac{1}{5t}\right) = 0$

110. $\frac{1}{x-2} = 3$

111. $\frac{4}{(x-4)^2} = 1$

112. $\frac{1}{(t+1)^2} = 1$

113. $|x-5| = 10$

114. $|2x+3| = 7$

In exercises 117-134, solve the inequality and graph the solution on the real number line. [NOTE: use the graphing system shown in the hints page.] Use a graphing utility to verify your solution.

117. $8x - 3 < 6x + 15$

118. $\frac{1}{2}(3-x) > \frac{1}{3}(2-3x)$

119. $-2 < -x + 7 \le 10$

120. $-6 \le 3 - 2(x-5) < 14$

121. $|x-2| < 1$

122. $|x| \le 4$

123. $\left|x - \frac{3}{2}\right| \ge \frac{3}{2}$

124. $|x-3| > 4$

125. $4|3-2x| \le 16$

126. $|x+9| + 7 > 19$

127. $x^2 - 2x \ge 3$

128. $4x^2 - 23x \le 6$

135. ***Accuracy of Measurement*** The side of a square is measured as 20.8 inches with a possible error of $-\frac{1}{16}$ inch. Using these measurements, determine the interval containing the area of the square.

True or False? **In exercises 136 and 137, determine whether the statement is true or false. Justify your answer.**

136. If $ab = 0$, then the point (a, b) lies on the x-axis or on the y-axis.

137. The graph of an equation may have two distinct y-intercepts.

139. In your own words, explain what is meant by equivalent equations. Describe the steps used to transform an equation into an equivalent equation.