

Carefully read all the problems. Try not to rush, and don't erase valuable work. All of your work should be shown. If you are requested to use a particular method, do it. But if you are unable, and do have a different method handy, then employ the one you have. Before you rush out, check your work. Then check it one more time.

Name: _____ Number: _____

Problem #	Problem rubric & comments	total
1	a) b) c)	
2	a) b) c)	
3	P A W Q	
4	P A W	
5	a) b) c) d)	
6	a) b) c) A W G	
7	a)	
8	a) b) c) d) e)	
9	a) b) c) d) e) f)	
10	a) P A W b)	
11	a) b) c)	
12	a) b)	
	Total	

1. Solve the following equations

(a) $4x - 4 = 7 - (x - 4)$

		1010-001	87.31
		1010-002	87.32
		1010-003	82.48
Traditional on Campus	89.77	1010-004	91.70
New	85.29	1010-005	91.02
Online	89.73	1010-006	85.85
Off Campus	83.9	1010-007	91.43
All	87.25	1010-021	78.75
		1010-060	87.20
		1010-070	
		1010-090	89.73

$x =$ _____

(b) $\log_3 x = -1$

		1010-001	43.59
		1010-002	19.72
		1010-003	32.04
Traditional on Campus	50.25	1010-004	67.30
New	25.69	1010-005	44.22
Online	61.26	1010-006	25.90
Off Campus	73.17	1010-007	51.79
All	39.74	1010-021	83.33
		1010-060	66.67
		1010-070	
		1010-090	61.26

$x =$ _____

(c) $\sqrt{2x+1} + 3 = 6$

		1010-001	90.00
		1010-002	75.92
		1010-003	74.11
Traditional on Campus	86.11	1010-004	87.17
New	75.16	1010-005	80.41
Online	80.27	1010-006	75.38
Off Campus	68.78	1010-007	82.86
All	79.10	1010-021	77.50
		1010-060	63.20
		1010-070	
		1010-090	80.27

$x =$ _____

2. The following problems need written justification:

(a) How else can you think of $8^{\frac{4}{3}}$ and why is that sensible?

		1010-001	62.98
		1010-002	73.77
		1010-003	61.43
Traditional on Campus	64.12	1010-004	63.68
New	67.75	1010-005	69.90
Online	65.20	1010-006	67.44
Off Campus	64.02	1010-007	61.61
All	66.00	1010-021	81.25
		1010-060	53.00
		1010-070	
		1010-090	65.20

(b) Simplify $x^a x^b$ and explain your answer (why is it true?).

		1010-001	65.87
		1010-002	50.70
		1010-003	57.75
Traditional on Campus	54.68	1010-004	50.47
New	54.69	1010-005	42.35
Online	59.46	1010-006	56.01
Off Campus	53.05	1010-007	48.66
All	66.00	1010-021	54.69
		1010-060	52.00
		1010-070	
		1010-090	59.46

(c) Give some argument for the fact that $3^0 = 1$

		1010-001	67.95
		1010-002	70.89
		1010-003	68.22
Traditional on Campus	69.47	1010-004	71.70
New	68.42	1010-005	70.07
Online	75.23	1010-006	65.89
Off Campus	39.84	1010-007	69.64
All	54.97	1010-021	33.33
		1010-060	44.00
		1010-070	
		1010-090	75.23

3. Solve the equation $x^2 + 4x - 21 = 0$ using factoring and explain with a picture, algebra, or words how you did it.

		1010-001	79.57
		1010-002	81.51
		1010-003	74.71
Traditional on Campus	79.20	1010-004	81.60
New	75.50	1010-005	72.45
Online	85.64	1010-006	69.67
Off Campus	89.33	1010-007	82.14
All	78.40	1010-021	90.63
		1010-060	88.50
		1010-070	
		1010-090	85.64

$x =$ _____

4. Solve the equation $x^2 + 6x = 7$ by completing the square and explain with a picture, algebra, or words how you did it.

		1010-001	55.22
		1010-002	59.86
		1010-003	58.91
Traditional on Campus	54.58	1010-004	56.06
New	57.57	1010-005	57.73
Online	52.70	1010-006	53.71
Off Campus	63.41	1010-007	49.23
All	56.35	1010-021	58.93
		1010-060	66.29
		1010-070	
		1010-090	52.70

$x =$ _____

5. A function is given by the rule $f(x) = 3^{x+2} + 1$, where x can be any real number.

(a) Fill in the following table:

x	$f(x)$
1	
2	
-1	
0	

		1010-001	88.46
		1010-002	92.96
		1010-003	92.76
		1010-004	94.34
		1010-005	97.96
		1010-006	94.32
		1010-007	96.43
		1010-021	85.42
		1010-060	92.00
		1010-070	
		1010-090	89.64

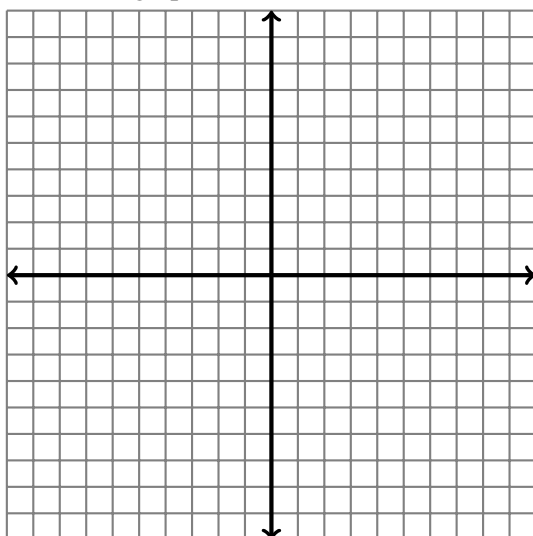
(b) What are the x -intercepts of f ?

		1010-001	36.38
		1010-002	51.76
		1010-003	50.13
		1010-004	46.54
		1010-005	26.53
		1010-006	58.40
		1010-007	32.14
		1010-021	35.42
		1010-060	32.67
		1010-070	
		1010-090	44.82

(c) What is the y -intercept of f ?

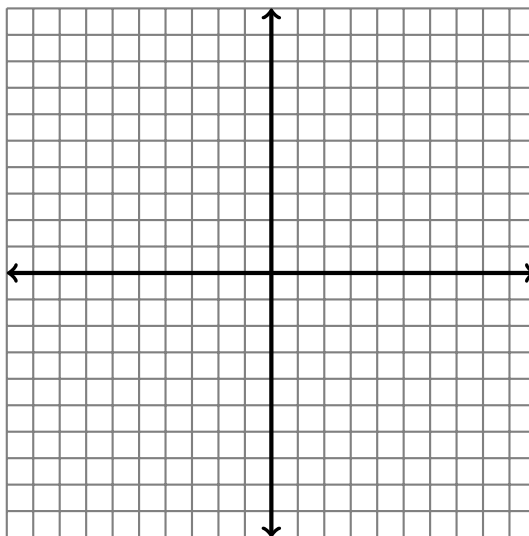
		1010-001	56.73
		1010-002	78.40
		1010-003	79.84
		1010-004	61.01
		1010-005	51.02
		1010-006	77.52
		1010-007	61.90
		1010-021	68.75
		1010-060	62.67
		1010-070	
		1010-090	72.07

(d) Sketch the graph of f .



		1010-001	56.73
		1010-002	77.26
		1010-003	85.49
Traditional on Campus	67.88	1010-004	73.05
New	81.21	1010-005	83.09
Online	58.69	1010-006	81.28
Off Campus	56.79	1010-007	70.41
All	73.72	1010-021	48.21
		1010-060	62.29
		1010-070	
		1010-090	58.69

6. (a) Sketch the graph of $3x + y = 8$.



		1010-001	78.27
		1010-002	87.46
		1010-003	82.02
Traditional on Campus	80.38	1010-004	88.68
New	84.61	1010-005	77.14
Online	82.70	1010-006	84.03
Off Campus	85.85	1010-007	79.29
All	83.02	1010-021	90.00
		1010-060	83.20
		1010-070	
		1010-090	82.70

- (b) Find the x- and y- intercepts and label them with their coordinates on the graph.

		1010-001	59.34
		1010-002	58.05
		1010-003	57.48
Traditional on Campus	60.85	1010-004	68.46
New	60.32	1010-005	48.40
Online	66.41	1010-006	65.67
Off Campus	73.52	1010-007	67.35
All	61.75	1010-021	65.18
		1010-060	78.86
		1010-070	
		1010-090	66.41

- (c) What is the slope of the line you graphed above? Explain how you figured this out, with words or algebra.

		1010-001	68.75
		1010-002	85.56
		1010-003	79.46
Traditional on Campus	76.43	1010-004	88.21
New	82.50	1010-005	73.47
Online	81.42	1010-006	82.17
Off Campus	85.37	1010-007	82.14
All	80.45	1010-021	81.25
		1010-060	88.00
		1010-070	
		1010-090	81.42

7. Find the expression for the inverse function of $g(x) = 2(x - 3)^3 + 5$.

		1010-001	51.76
		1010-002	48.24
		1010-003	46.77
Traditional on Campus	46.82	1010-004	49.37
New	50.83	1010-005	47.28
Online	46.17	1010-006	57.75
Off Campus	33.33	1010-007	34.82
All	48.06	1010-021	29.17
		1010-060	36.00
		1010-070	
		1010-090	46.17

8. When you are pricked with a pin, there is a short time delay before you say, "Ouch!" This reaction time varies linearly with the distance between your brain and the place you are pricked. Dr. Hollers pricks Leslie Morley's finger and toe, and measures reaction times of 15.2 and 22.9 milliseconds, respectively. (A millisecond is 10^{-3} of a second.) Leslie's finger is 100 cm from the brain, and her toe is 170 cm from the brain.

(a) Write the particular equation expressing time delay in terms of distance.

		1010-001	30.89
		1010-002	33.27
		1010-003	42.34
Traditional on Campus	30.92	1010-004	37.50
New	39.00	1010-005	29.34
Online	31.42	1010-006	41.96
Off Campus	21.04	1010-007	26.12
All	34.53	1010-021	11.72
		1010-060	27.00
		1010-070	
		1010-090	31.42

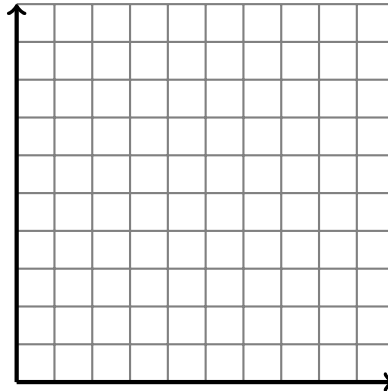
(b) How long would it take Leslie to say "Ouch!" if pricked in the neck, 10 cm from the brain?

		1010-001	28.85
		1010-002	26.76
		1010-003	53.68
Traditional on Campus	32.63	1010-004	47.64
New	42.06	1010-005	32.65
Online	31.42	1010-006	47.29
Off Campus	29.88	1010-007	25.45
All	37.16	1010-021	6.25
		1010-060	45.00
		1010-070	
		1010-090	31.42

(c) What does the time-intercept equal, and what does it represent in the real world?

		1010-001	16.62
		1010-002	20.93
		1010-003	28.02
Traditional on Campus	15.87	1010-004	14.02
New	25.61	1010-005	17.78
Online	22.78	1010-006	28.35
Off Campus	19.16	1010-007	14.54
All	21.66	1010-021	4.46
		1010-060	28.57
		1010-070	
		1010-090	22.78

(d) Choose an appropriate scale and graph the data on the following coordinate axis:



		1010-001	34.23
		1010-002	57.61
		1010-003	57.52
Traditional on Campus	37.10	1010-004	38.49
New	57.20	1010-005	43.67
Online	47.30	1010-006	56.43
Off Campus	58.05	1010-007	35.36
All	49.55	1010-021	52.50
		1010-060	61.60
		1010-070	
		1010-090	47.30

- (e) Since the slope is in milliseconds per centimeter, its reciprocal is the speed which nerve impulses travel in centimeters per millisecond. How fast do the impulses travel in cm/sec?

		1010-001	9.13
		1010-002	3.52
		1010-003	15.50
Traditional on Campus	7.06	1010-004	4.72
New	10.00	1010-005	9.18
Online	9.46	1010-006	11.63
Off Campus	24.39	1010-007	3.57
All	9.68	1010-021	9.38
		1010-060	34.00
		1010-070	
		1010-090	9.46

9. The following chart summarizes some values of two functions f and g .

x	$f(x)$	$g(x)$
1	3	4
2	5	9
3	4	9
4	1	4

In each of the following questions record some evidence for choosing your answer.

(a) What is the value of $f(4)$?

		1010-001	52.88
		1010-002	52.11
		1010-003	55.04
Traditional on Campus	54.58	1010-004	52.83
New	57.00	1010-005	61.22
Online	58.78	1010-006	64.34
Off Campus	78.05	1010-007	53.57
All	57.55	1010-021	68.75
		1010-060	84.00
		1010-070	
		1010-090	58.78

$f(4) =$

(b) Evaluate $g(3)$.

		1010-001	52.88
		1010-002	51.06
		1010-003	54.26
Traditional on Campus	54.20	1010-004	50.94
New	56.50	1010-005	62.24
Online	57.43	1010-006	64.73
Off Campus	75.61	1010-007	52.68
All	56.90	1010-021	68.75
		1010-060	80.00
		1010-070	
		1010-090	57.43

$g(3) =$ _____

(c) Compute $(f \circ g)(1)$.

		1010-001	40.71
		1010-002	42.02
		1010-003	48.58
Traditional on Campus	37.02	1010-004	42.77
New	45.14	1010-005	26.53
Online	43.24	1010-006	45.22
Off Campus	39.84	1010-007	33.93
All	42.02	1010-021	31.25
		1010-060	45.33
		1010-070	
		1010-090	43.24

$$(f \circ g)(1) = \underline{\hspace{10em}}$$

(d) Could $g(x)$ be invertible? Explain your answer.

		1010-001	17.55
		1010-002	58.98
		1010-003	70.16
Traditional on Campus	26.81	1010-004	38.21
New	65.00	1010-005	24.49
Online	29.73	1010-006	66.47
Off Campus	46.95	1010-007	35.27
All	47.68	1010-021	35.94
		1010-060	54.00
		1010-070	
		1010-090	29.73

(e) Is $f(x)$ invertible?

		1010-001	33.33
		1010-002	59.39
		1010-003	53.23
Traditional on Campus	36.01	1010-004	38.36
New	59.67	1010-005	28.57
Online	27.93	1010-006	66.41
Off Campus	66.67	1010-007	45.24
All	49.08	1010-021	75.00
		1010-060	61.33
		1010-070	
		1010-090	27.93

(f) If $f(x)$ were invertible, what would the value of $f^{-1}(3)$ have to be?

		1010-001	13.94
		1010-002	34.51
		1010-003	30.04
Traditional on Campus	13.45	1010-004	20.28
New	37.88	1010-005	4.08
Online	11.15	1010-006	49.42
Off Campus	20.73	1010-007	14.29
All	26.13	1010-021	6.25
		1010-060	30.00
		1010-070	
		1010-090	11.15

$f^{-1}(3) = \underline{\hspace{10cm}}$

10. A student from a different Math 1010 class is under the impression that $(a + b)^2 = a^2 + b^2$.

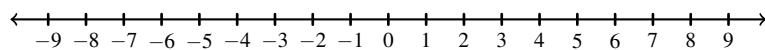
(a) Explain to the student why he is wrong (explain with a picture, algebra, or words).

		1010-001	90.38
		1010-002	78.40
		1010-003	72.87
Traditional on Campus	89.95	1010-004	96.86
New	76.42	1010-005	87.76
Online	91.44	1010-006	77.78
Off Campus	79.67	1010-007	84.52
All	82.54	1010-021	66.67
		1010-060	88.00
		1010-070	
		1010-090	91.44

(b) Are there values for a and b such that $(a + b)^2 = a^2 + b^2$?

		1010-001	53.37
		1010-002	42.25
		1010-003	43.41
Traditional on Campus	48.85	1010-004	52.83
New	39.13	1010-005	42.86
Online	41.22	1010-006	31.40
Off Campus	48.78	1010-007	41.96
All	43.10	1010-021	21.88
		1010-060	66.00
		1010-070	
		1010-090	41.22

11. On the number line below mark all points that are 7 units away from 0:



For any real number a we define $|a|$ to be the distance from a to 0.

(a) How many solutions are there for the equation $|a| = 7$.

		1010-001	86.06
		1010-002	80.99
		1010-003	82.36
Traditional on Campus	84.16	1010-004	81.60
New	82.38	1010-005	85.71
Online	87.50	1010-006	83.91
Off Campus	89.63	1010-007	81.70
All	83.81	1010-021	85.94
		1010-060	92.00
		1010-070	
		1010-090	87.50

(b) Find all the solutions to the equation $|x - 7| = -2$. Explain how you figured this out.

		1010-001	46.15
		1010-002	42.96
		1010-003	40.31
Traditional on Campus	44.66	1010-004	50.47
New	40.94	1010-005	37.24
Online	47.64	1010-006	39.34
Off Campus	32.93	1010-007	42.86
All	42.35	1010-021	25.00
		1010-060	38.00
		1010-070	
		1010-090	47.64

(c) Find all the solutions to the equation $|x - 7| = 2$. Explain how you figured this out.

		1010-001	48.08
		1010-002	47.04
		1010-003	40.47
Traditional on Campus	55.57	1010-004	43.77
New	47.17	1010-005	75.51
Online	52.43	1010-006	53.95
Off Campus	66.83	1010-007	63.21
All	51.50	1010-021	71.25
		1010-060	64.00
		1010-070	
		1010-090	52.43

12. This is what Wikipedia tells us: Radiocarbon dating (or simply carbon dating) is a radiometric dating technique that uses the decay of carbon-14 to estimate the age of organic materials, such as wood and leather, up to about 58,000 to 62,000 years. Carbon dating was presented to the world by Willard Libby in 1949, for which he was awarded the Nobel Prize in Chemistry. Basically, the way it works is that we know how long carbon-14 takes to decompose to half the initial amount, and by observing how much carbon is in a given sample, we can decide how old the sample is. It is known that carbon-14 has a half-life of 5730 years.

- (a) What kind of function do you expect will model the decay of carbon 14? Explain what evidence you have for your claim.

		1010-001	20.38
		1010-002	49.15
		1010-003	39.22
Traditional on Campus	23.36	1010-004	27.17
New	45.45	1010-005	25.31
Online	36.76	1010-006	47.60
Off Campus	24.88	1010-007	23.57
All	36.13	1010-021	7.50
		1010-060	36.00
		1010-070	
		1010-090	36.76

- (b) Write an algebraic expression (rule) for the function that models the decay of carbon-14.

		1010-001	26.28
		1010-002	30.99
		1010-003	22.48
Traditional on Campus	20.74	1010-004	18.87
New	30.42	1010-005	16.33
Online	10.14	1010-006	37.73
Off Campus	14.23	1010-007	16.07
All	26.02	1010-021	0.00
		1010-060	46.67
		1010-070	
		1010-090	10.14

While the sections 1010-021 and 010-060 used the same grading rubric, the graders were not the same as for the rest of the sections. These sections should not be used for comparison.