Math 124E - Summer 2020 - Exam #1
DUE WEDNESDAY, MAY 13, 2020 BY 11:59PM

Name: Answer Key

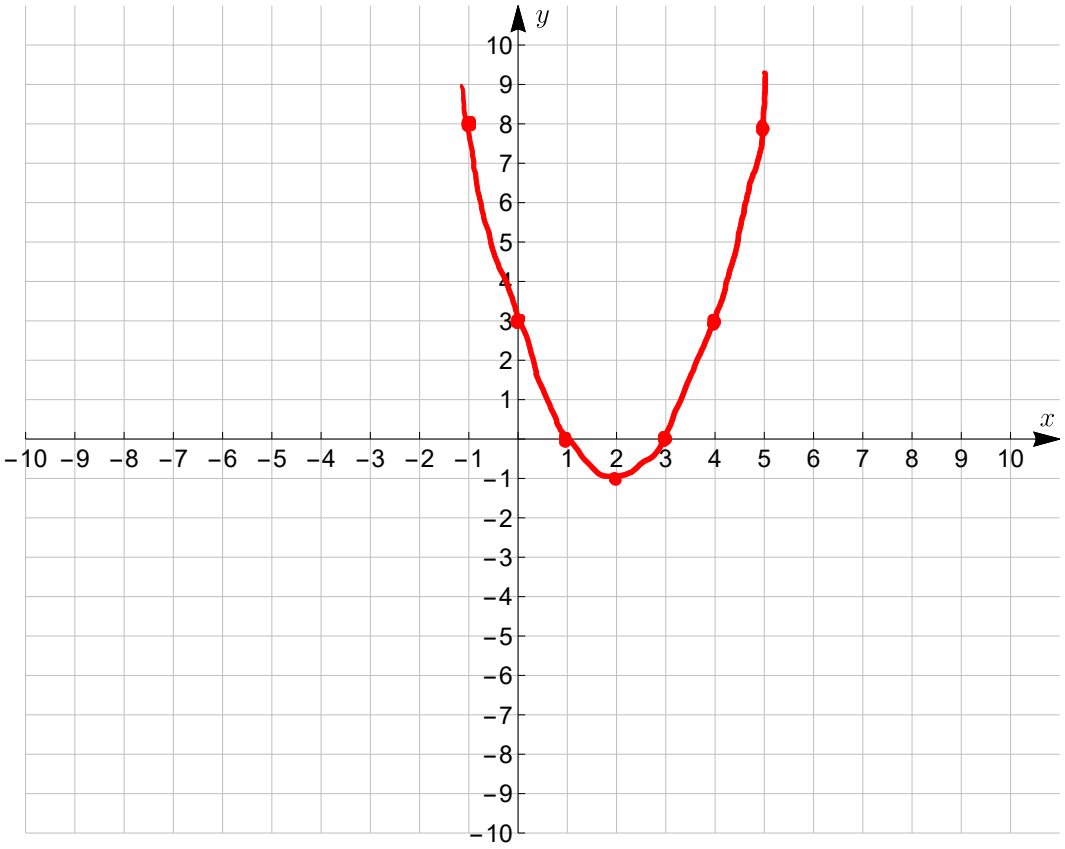
HONOR CODE: On my honor, I have neither given nor received any aid on this examination that is not explicitly allowed in the instructions.

Signature: _____

Instructions: You may review the videos in MyMathLab or the course website, use the e-book, the MyMathLab homework and quizzes, and your calculator when working on this exam. **You may <u>not</u> receive help from anyone else, give help to anyone else, discuss any aspect of the exam or any items related to the exam with anyone else, or use any resources not specified in the previous sentence.** You may submit your answers and scratch work either on a printed copy of this exam or on your own paper. If you use your own paper, you do **not** need to copy the question; just be sure you clearly label which question the scratch work and answer belong to. If I can't tell with certainty which question any scratch work or answer belongs to, you will not receive credit for that work or answer. If you use your own paper, you **DO** need to copy the honor code above and sign it. To submit your scratch work and answers, you can either scan your work (if you have access to a scanner) or take pictures with your cell phone, then email me your scans or pictures. Be sure the writing in your scans or pictures is dark enough and clear enough that I can easily read what you've written. If I can't read what you've written, I can't give you credit for it. Make sure your final answers are clearly labeled. **SHOW ALL WORK ON THIS EXAM IN ORDER TO RECEIVE FULL CREDIT!!!**

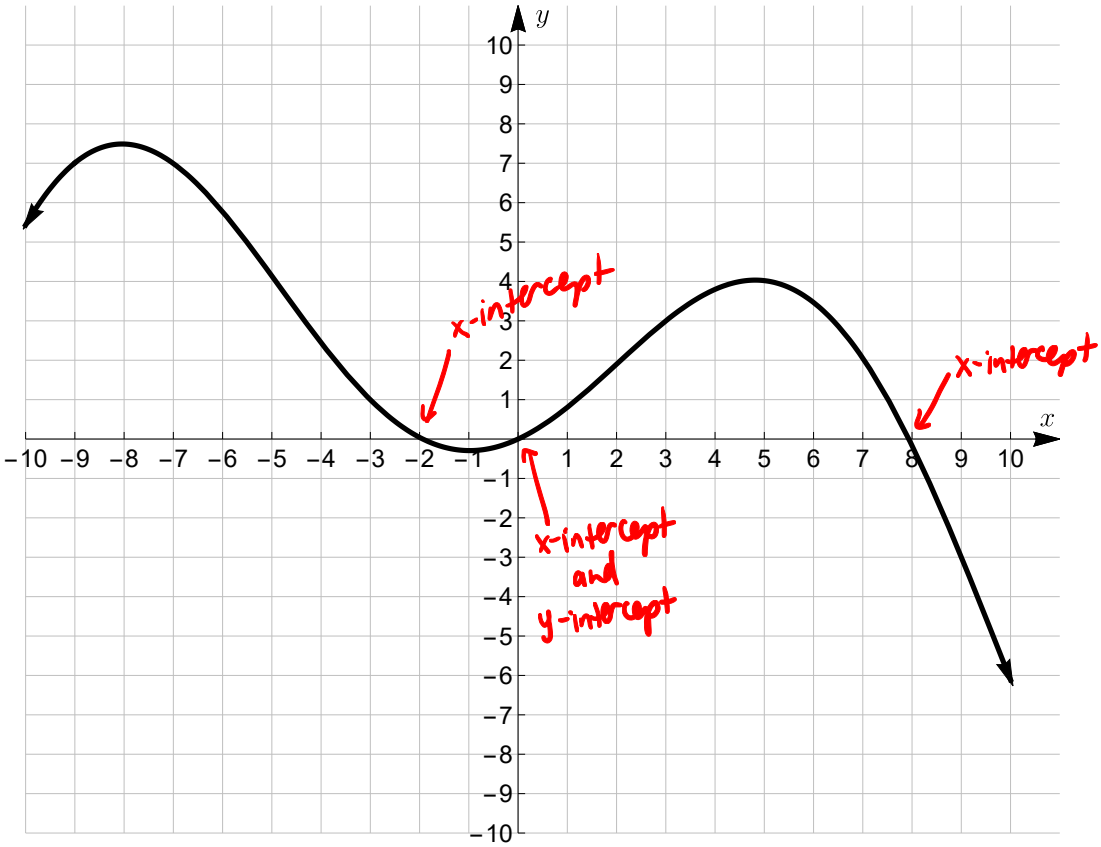
No.	Score
1	/5
2	/5
3	/20
4	/5
5	/5
6	/5
7	/20
8	/15
9	/5
10	/15
Total	/100

1. Graph the equation $y = (x-2)^2 - 1$. Let $x = -1, 0, 1, 2, 3, 4, 5$. (5 points)



x	$y = (x-2)^2 - 1$
-1	$y = (-1-2)^2 - 1 = 8$
0	$y = (0-2)^2 - 1 = 3$
1	$y = (1-2)^2 - 1 = 0$
2	$y = (2-2)^2 - 1 = -1$
3	$y = (3-2)^2 - 1 = 0$
4	$y = (4-2)^2 - 1 = 3$
5	$y = (5-2)^2 - 1 = 8$

2. Determine the x-intercept(s) and y-intercept(s) of the following graph. If there are no x-intercepts and/or y-intercepts, indicate so. (5 points)



x-intercepts: $(-2,0), (0,0), (8,0)$

y-intercept: $(0,0)$

3. Solve each of the following equations. (5 points each)

(a) $3x - 7 = 5x + 3$ (5 point2)

$-3x \quad -3 \quad -3x \quad -3$

$-10 = 2x$

$\frac{-10}{2} = \frac{2x}{2}$

$x = -5$

(b) $\frac{x}{3} = 1 + \frac{x-10}{2}$

LCD = 6

$6\left(\frac{x}{3}\right) = 6\left(1 + \frac{x-10}{2}\right)$

$2 \cdot 6\left(\frac{x}{3}\right) = 6(1) + 3 \cdot 6\left(\frac{x-10}{2}\right)$

$2x = 6 + 3(x-10)$

$2x = 6 + 3x - 30$

$2x = 3x - 24$

$-3x \quad -3x$

$-x = -24$

$\frac{-x}{-1} = \frac{-24}{-1}$

$x = 24$

(c) $\dfrac{2}{x} = \dfrac{3}{4x} - 1$

$x = 0$ not allowed

$\frac{4x}{4} = \frac{0}{4}$

$x = 0$

LCD $= 4x$

$4x\left(\frac{2}{x}\right) = 4x\left(\frac{3}{4x} - 1\right)$

$4x\left(\frac{2}{x}\right) = 4x\left(\frac{3}{4x}\right) - 1(4x)$

$4(2) = 3 - 4x$

$8 = 3 - 4x$

$-3 \quad -3$

$\frac{5}{-4} = \frac{-4x}{-4}$

$x = -\frac{5}{4}$

(d) $\dfrac{4}{5x - 10} = \dfrac{2}{x - 2} - \dfrac{3}{5}$

$5x - 10 = 0$

$+10 \quad +10$

$\frac{5x}{5} = \frac{10}{5}$

$x = 2$ not allowed

$x - 2 = 0$

$+2 \quad +2$

$x = 2$

$5 \neq 0$

LCD $= 5(x-2)$

$5(x-2)\left(\frac{4}{5(x-2)}\right) = 5(x-2)\left(\frac{2}{x-2} - \frac{3}{5}\right)$

$5(x-2)\left(\frac{4}{5(x-2)}\right) = 5(x-2)\left(\frac{2}{x-2}\right) - 5(x-2)\left(\frac{3}{5}\right)$

$4 = 5(2) - 3(x-2)$

$4 = 10 - 3x + 6$

$4 = 16 - 3x$

$-16 \quad -16$

$\frac{-12}{-3} = \frac{-3x}{-3}$

$x = 4$

4. After an 8% sales tax, a new cell phone costs \$1026. Find the cost of the cell phone before tax is added. (5 points)

x = original price

sale price = 1026

sale price = original price + amount of taxes paid

8% of original price

0.08 multiply x

$1026 = x + 0.08x$

$\frac{1026}{1.08} = \frac{1.08x}{1.08}$

$x = 950$

5. Solve the following formula for m. (5 points)

$$S = mp - Amt$$

$$\frac{S}{p - At} = \frac{m(p - At)}{p - At}$$

$$m = \frac{S}{p - At}$$

6. Perform the indicated operations and write the result in standard form. (5 points)

$$\frac{8-\sqrt{-48}}{12}$$

$\frac{8-i\sqrt{48}}{12}$

$\frac{8-4i\sqrt{3}}{12}$

$\frac{4(2-i\sqrt{3})}{12\ 3}$

$\frac{2-i\sqrt{3}}{3}$

$\frac{2}{3}-\frac{\sqrt{3}}{3}i$

48
16 3

$\sqrt{48}=\sqrt{16}\cdot\sqrt{3}$ (4)

$=4\sqrt{3}$

7. Solve each of the following equations. (5 points each)

(a) $4(x-3)^2 = 200$

$\frac{4(x-3)^2}{4} = \frac{200}{4}$

$(x-3)^2 = 50$

$\sqrt{(x-3)^2} = \pm\sqrt{50}$

$x-3 = \pm 5\sqrt{2}$

$+3 \quad +3$

$x = 3 \pm 5\sqrt{2}$

50 = 25 · 2

$\sqrt{50} = \sqrt{25}\cdot\sqrt{2}$

$= 5\sqrt{2}$

(b) $4x = 2x^2 - 9$

$-4x \quad -4x$

$0 = 2x^2 - 4x - 9$

$a = 2$, $b = -4$, $c = -9$

$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(-9)}}{2(2)} = \frac{4 \pm \sqrt{16+72}}{4} = \frac{4 \pm \sqrt{88}}{4}$

$x = \frac{4 \pm 2\sqrt{22}}{4} = \frac{2(2 \pm \sqrt{22})}{4_2}$

$x = \frac{2 \pm \sqrt{22}}{2}$

88 = 4 · 22

22 = 2 · 11

$\sqrt{88} = \sqrt{4}\cdot\sqrt{22}$

$= 2\sqrt{22}$

(c) $4x^3 - 9x = 24x^2 - 54$

$-24x^2+54 \quad -24x^2+54$

$4x^3-24x^2-9x+54=0$

$(4x^3-24x^2)+(-9x+54)=0$

$4x^2(x-6)-9(x-6)=0$

$(x-6)(4x^2-9)=0$

$(2x)^2-3^2$

$(x-6)(2x+3)(2x-3)=0$

$x-6=0$ $\quad 2x+3=0$ $\quad 2x-3=0$

$+6\ +6 \quad -3\ -3 \quad +3\ +3$

$x=6 \quad \frac{2x}{2}=\frac{-3}{2} \quad \frac{2x}{2}=\frac{3}{2}$

$x=-\frac{3}{2} \quad x=\frac{3}{2}$

(d) $4x^4 - 65x^2 + 16 = 0$

$(4x^2-1)(x^2-16)=0$

$(2x)^2-1^2 \quad x^2-4^2$

$(2x+1)(2x-1)(x+4)(x-4)=0$

$2x+1=0$ $\quad 2x-1=0$ $\quad x+4=0$ $\quad x-4=0$

$-1\ -1 \quad +1\ +1 \quad -4\ -4 \quad +4\ +4$

$\frac{2x}{2}=\frac{-1}{2} \quad \frac{2x}{2}=\frac{1}{2} \quad x=-4 \quad x=4$

$x=-\frac{1}{2} \quad x=\frac{1}{2}$

8. Solve each of the following equations. (5 points each)

(a) $(x+6)^{\frac{2}{5}} = 9$

$\left(\sqrt[5]{x+6}\right)^2 = 9$

$\sqrt{\left(\sqrt[5]{x+6}\right)^2} = \pm\sqrt{9}$

$\sqrt[5]{x+6} = \pm 3$

$\left(\sqrt[5]{x+6}\right)^5 = (\pm 3)^5$

$x+6 = \pm 243$

$-6 \quad -6$

$x = -6 \pm 243$

$x = -6 + 243$ $\qquad$ $x = -6 - 243$

$x = 237$ $\qquad$ $x = -249$

(b) $\frac{5|2x+8|}{5} = \frac{20}{5}$

$|2x+8| = 4$

$2x+8 = 4$ or $2x+8 = -4$

$-8 \quad -8$ $\qquad$ $-8 \quad -8$

$\frac{2x}{2} = \frac{-4}{2}$ $\qquad$ $\frac{2x}{2} = \frac{-12}{2}$

$x = -2$ $\qquad$ $x = -6$

(c) $\left(\sqrt{6x+37}\right)^2 = (x+5)^2$

$6x+37 = (x+5)(x+5)$

$6x+37 = x^2+5x+5x+25$

$6x+37 = x^2+10x+25$

$-6x \quad -37 \qquad -6x \quad -37$

$0 = x^2+4x-12$

$0 = (x+6)(x-2)$

$x+6=0 \qquad x-2=0$

$-6 \quad -6 \qquad +2 \quad +2$

$x=-6 \qquad x=2$

Check $x=-6$: $\sqrt{6(-6)+37} = -6+5$

$\sqrt{-36+37} = -1$

$\sqrt{1} = -1$

False

$x=-6$ is not a solution

Check $x=2$: $\sqrt{6(2)+37} = 2+5$

$\sqrt{12+37} = 7$

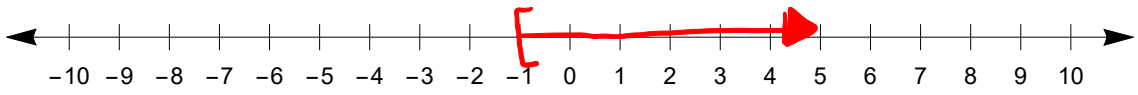
$\sqrt{49} = 7$

$7 = 7$ ✓

$x=2$ is a solution

9. Solve the following inequality. Use interval notation to express the solution set and graph the solution on a number line. (5 points)

$$9 - (x + 1) \geq 5 - 4x$$



$9-(x+1) \geq 5-4x$

$9-x-1 \geq 5-4x$

$8-x \geq 5-4x$

$-8 \quad +4x \quad -8 \quad +4x$

$\frac{3x}{3} \geq \frac{-3}{3}$

$x \geq -1$

$[-1, \infty)$

10. Solve each of the following inequalities. State your solution in interval notation. (5 points each)

(a) $-17 \leq -6x - 5 < 13$

$+5 \quad +5 \quad +5$

$-12 \leq -6x < 18$

$\frac{-12}{-6} \leq \frac{-6x}{-6} < \frac{18}{-6}$

$2 \geq x > -3$

$-3 < x \leq 2$

$(-3, 2]$

(b) $|3x + 9| < 15$

$-15 < 3x + 9 < 15$

$-9 \quad -9 \quad -9$

$\frac{-24}{3} < \frac{3x}{3} < \frac{6}{3}$

$-8 < x < 2$

$(-8, 2)$

(c) $|4x - 4| \geq 8$

$4x - 4 \geq 8$ or $4x - 4 \leq -8$

$+4 \quad +4 \qquad +4 \quad +4$

$\frac{4x}{4} \geq \frac{12}{4} \qquad \frac{4x}{4} \leq \frac{-4}{4}$

$x \geq 3 \qquad x \leq -1$

$(-\infty, -1] \cup [3, \infty)$