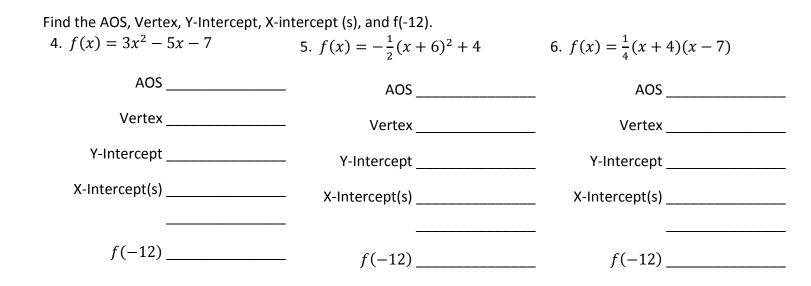When applicable, round to the nearest **hundredths**.

Solve for the points of intersection.

1. $y = 2x^2 + x - 3$; $y = 3x + 1$ 2. $y = x^2 + 8$; $y = 5 - 6x$ 3. $y = 2x^2 + 12x - 4$; $y = 2x - 1$

Find the AOS, Vertex, Y-Intercept, X-intercept (s), and f(-12).

4. $f(x) = 3x^2 - 5x - 7$ 5. $f(x) = -\frac{1}{2}(x + 6)^2 + 4$ 6. $f(x) = \frac{1}{4}(x + 4)(x - 7)$

AOS _____	AOS _____	AOS _____
Vertex _____	Vertex _____	Vertex _____
Y-Intercept _____	Y-Intercept _____	Y-Intercept _____
X-Intercept(s) _____ _____	X-Intercept(s) _____ _____	X-Intercept(s) _____ _____
$f(-12)$ _____	$f(-12)$ _____	$f(-12)$ _____

7. As the number of farms has decreased in the United States, the average size of the remaining farms has grown larger, as shown in the table below.

Year	1910	1920	1930	1940	1950	1959	1969	1978	1987	1997
Average Acreage per farm	139	149	157	175	216	303	390	449	462	487

        a. Determine the linear regression.

        b. Determine the quadratic regression.

        c. Which equations should be used to BEST describe the data set? Explain your answer.

        d. Using the function that fits the data best, predict the average acreage in 2000 and 2010.

8. Southern Granite and Marble sells granite and marble by the square yard. One of its granite patterns is price sensitive. If the price is too low, customers perceive that it has less quality. If the price is too high, customers perceive that it is overpriced. The company conducted a pricing test with potential customers. The following data was collected.

Price	$20	$30	$40	$60	$80	$100	$110
Buyers	30	50	65	75	72	50	25

        a. Determine the linear regression.

        b. Determine the quadratic regression.

        c. Which equations should be used to BEST describe the data set? Explain your answer.

        d. According the equation that best fits the data, how many buyers would you expect with a price of $75?

9. A charter company will provide a plane for a fare of $60 each for 20 or fewer passengers. For each passenger in excess of 20, the fare is decreased $2 per person for everyone. What number of passengers will produce the greatest revenue for the company? What is the greatest revenue?

10. A ticket to the school dance is $8 and usually 250 students attend. The dance committee know that for every $0.75 increase in the price of a ticket, 15 fewer students attend the dance. What ticket price maximizes revenue? How many students will attend the dance?

11. The manager of an 80-unit apartment complex is trying to decide what rent to charge. Experience has shown that at a rent of $200, all of the units will be full, but one additional unit will remain vacant for each $20 increase in rent. Find the number of occupied units if the total revenue is $20, 020. What is the rent to maximize profit?

12. A company models its annual profits using the function, $P(x) = x^2 + 20x - 300$ with P represents profits and x gives the number of units sold. One year, their profits were $167,700. How many units of their product did they sell.

13. The number of bacteria in a refrigerated food is given by $N(t) = 20x^2 - 20x + 120$. Where t is the temperature of the food in Celsius. At what temperature will the number of bacteria be minimal?

14. The number of baseball games that must be scheduled in a league with n teams is given by $G(n) = \frac{n^2 - n}{2}$ where each team plays every other team exactly once. A league schedules 15 games; how many teams are in the league?

15. Some fireworks are fired vertically into the air from the ground at an initial velocity of 80 feet per second. Find the highest point reached by the firework, just before is explodes.

16. Sam and Sara have taken their math textbooks to the top of the twelve-story building and look at the pool which is 160 feet straight below them. Same just lets go of his book, while Sara throws her books down with an initial velocity of 48 feet per second. How many seconds does it take each book to hit the water? Who's book hits first?

17. A bald eagle snatches a fish from a lake and flies to an altitude of 325ft. The fish manages to squirm free and falls back down into the lake. Its height h in feet can be modeled by $h(t) = -16t^2 + 325$ where t is the time in seconds. How many seconds will the fish fall before hitting the water?

18. An open box is to be made from a 16 inch by 30 inch piece of cardboard by cutting out squares of equal size to form the four corners and bending up the sides. What size should the squares be to obtain a box with the largest possible volume?

19. Travis wants to make a toy box for his little sister. To make the box, he purchases a 6 foot by 8 foot piece of plywood from Lowes. To make the box, Travis will cut squares of equal size to form the four corners and bending up the sides. What is the maximum volume of the box that Travis can make?

20. Evan has a set of plans to build a wooden box that measures 12 inches by 7 inches by 9 inches. He wants to reduce the volume of the box to 163.63 cubic inches. He would like to reduce the length, width, and height by the same amount. How much should Evan take from each dimension?