1. The percent of sunlight beneath the surface of the ocean reduces at a rate of 2.5% for every x feet below the surface starting 20 feet below the surface up to a maximum depth of 600 feet. (7-1)

A. Write an exponential function that models the percent of sunlight that reaches any depth.
B. Does the model represent exponential growth or decay? Why?
C. Graph the function from part **(A)**. Make your graph neat and accurate. Clearly label the x and y-axis.
D. Find the percent of sunlight 50 feet beneath the surface of the ocean.
E. Find the depth where the percent of sunlight is 1%. Solve algebraically.

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2. The population of a certain animal species decreases at a rate of 3.5% per year. You have counted 80 of the animals in the habitat you are studying. (7-1)

A. Write an exponential function that models the change in the animal population.
B. Does the model represent exponential growth or decay? Why?
C. Graph the function from part **(A)**. Make your graph neat and accurate. Clearly label the x and y-axis.
D. Find the number of animals in the habitat after 25 years.
E. In about how many years will it take to have only one animal left in the habitat? Solve algebraically.
F. Will the habitat be able to recover?

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3. While you are waiting for your tennis partner to show up, you drop your tennis ball from 5 feet. Its rebound was approximately 35 inches on the first bounce and 20.4 inches on the second bounce. (7-1)

A. Write an exponential function that models the bouncing ball.
B. Does the model represent exponential growth or decay? Why?
C. Graph the function from part **(A)**. Make your graph neat and accurate. Clearly label the x and y-axis.
D. Find the height of the ball after 10 bounces.
E. How many bounces are needed for the ball to be one-tenth of an inch above the ground?

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4. Your friend invested $1000 in an account that pays 6.5% annual interest. (7-1)

A. Write an exponential model for the amount of money your friend will have in the account after t years.
B. Does the model represent exponential growth or decay? Why?
C. Graph the function from part **(A)**. Make your graph neat and accurate. Clearly label the x and y-axis.
D. How much will be in your friend's account after 4 years?
E. How much interest does your friend's account earn in 4 years?
F. How long will it take your friend's account to double?

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5. Your friend invested $2000 in an account that pays 4% annual interest compounded continuously. (7-2)

A. Write an exponential model for the amount of money your friend will have in the account after t years.
B. Does the model represent exponential growth or decay? Why?
C. Graph the function from part **(A)**. Make your graph neat and accurate. Clearly label the x and y-axis.
D. How much will be in your friend's account after 5 years?
E. How much interest does your friend's account earn in 5 years?
F. How long will it take your friend's account to double?

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6. A gardener is putting a wire fence along the edge of his garden to keep animals from eating his plants. He has 20 yards of fence. (3-1)

A. Write an equation to model the area of the garden.
B. Find the coordinates of the vertex. What does this tell you about your garden?
C. Graph the function from part **(A)**. Make your graph neat and accurate. Clearly label the x and y-axis.

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7. You are working for a packaging company and are designing a box that has a rectangular bottom with a perimeter of 36 inches. The box must be 4 inches high. (3-2)

A. Write an equation to model the volume of the box.
B. Find the coordinates of the vertex. What does this tell you about your box?
C. Graph the function from part **(A)**. Make your graph neat and accurate. Clearly label the x and y-axis.

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8. You have a 24-inch by 16-inch painting you wish to frame. The frame will be the same width around the entire painting. You have 276 in^2 of framing material. (3-4)

A. Draw a diagram to represent the painting and the frame around the painting.
B. Write an equation to model the width of the frame around the painting.
C. How wide should the frame be?

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9. A rectangular swimming pool is 6 feet deep. One side of the pool is 2.5 times as long as the other. The amount of water needed to fill the swimming pool is 2160 $feet^3$. (3-5)

A. Draw a diagram to represent your swimming pool. Be sure to label it.
B. Write an equation to model the volume of your swimming pool.
C. Find the dimensions of the swimming pool.

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10. The length of a rectangular garden is $2x$ and its width is $x - 3$. The garden's area is 80 ft^2. (3-5)

A. Draw a diagram to represent your garden. Be sure to label it.
B. Write an equation to model the area of the garden.
C. Find the dimensions of the garden.

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11. The volcanic cinder cone Puu Puai in Hawaii was formed in 1959 when a massive "lava formation" erupted at Kilauea Iki Crater, shooting lava hundreds of feet into the air. When the eruption was most intense, the height h (in feet) of the lava t seconds after being ejected from the ground could be modeled by $h = -16t^2 + 350t$. (3-2)

A. Graph the function.
B. Find the lava's maximum height above the ground.
C. How long was the lava in the air?

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12. The atmospheric pressure P (in lbs/in^2) of an object d miles above sea level can be modeled by $P = 14.7e^{-0.21d}$.

A. Make a table of values for $0 \le d \le 10$ then graph the function. State the domain and the range.
B. Does the model represent exponential growth or decay? Why?
C. From the graph, about how high are you if the atmospheric pressure is 5.5 lbs/in^2? Convert your answer to feet (1 mile = 5280 feet). Where on Earth are you?
D. How high are you if the atmospheric pressure is 0.00009 lbs/in^2? Solve Algebraically. Where on Earth are you?

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13. *City Year* is a national youth service program that began with 57 members in Boston in 1989. The organization has expanded since then and currently has sites in cities across the country. The table below gives the enrollment for the *City Year* national youth service program from 1989 to 1998. (2-3)

Years since 1989	0	1	2	3	4	5	6	7	8	9
Enrollment	57	76	107	234	371	688	678	716	894	918

A. Make a scatter plot of the data from the table. Be extremely neat.
B. Write an equation for the line of best fit.
C. From your equation, how many people will enroll in *City Year* in 2010?

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14. The table below shows the winning times in the Olympic 100 meter freestyle swimming event for the period 1968-1996.

Years since 1968, x	0	4	8	12	16	20	24	28
Men's time (sec), m	52.2	51.2	50.0	50.4	49.8	48.6	49.0	48.7
Women's time (sec), w	60.0	58.6	55.7	54.8	55.9	54.9	54.6	54.5

A. Make two different scatter plots on the same graph from the data above.
B. For each scatter plot, find an equation of the line of best fit.
C. Find the point of intersection of the two lines. What does this point represent?

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15. In yesterday's swim meet, Kerman High dominated in the individual events, with 24 individual event placers scoring a total of 56 points. A first-place finish scores 5 points, a second-place finish scores 3 points, and a third-place finish scores 1 point. The swim team had as many third-place finishers as first- and second-place finishers combined that really shows the team's depth. (2-9)

A. Write a system of equations that models the above information.
B. Solve the system to find how many swimmers finished in each place.

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16. You just received an inheritance of $20,000. Instead of spending it (yes, I know that's hard not to do), you decide to invest it. So, you put some of the money into a savings account that earns 2% interest annually and invest the rest in certificates of deposit (CDs) and bonds. A broker tells you that CDs pay 5% interest annually and bonds pay 6% interest annually. You want to earn $1000 interest per year, and you want twice as much money in CDs as in bonds. (2-9)

A. Write a system of equations that models the above information.
B. Solve the system to find how much should be put in each type of investment.

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17. In a factory there are three machines, *A*, *B*, and *C*. When all three machines are working, they produce 287 bolts per hour. When only *A* and *C* are working, they produce 197 bolts per hour. When only machines *A* and *B* are working, they produce 202 bolts per hour. (2-9)

A. Write a system of equations that models the above information.
B. How many bolts can each machine produce per hour?
