

DIRECTIONS: Part I (52 points) is to be done without a calculator. When you finish part I, turn it in and receive part II (48 points) which requires a graphing calculator. You have the class period to complete both parts. (Each of the following problems worth 2 points)

For each of the following problems, select the best choice for the function described as:

- a) linear b) quadratic c) exponential d) inverse variation e) sine f) other

1.

| x | y |
|----|-----|
| -4 | 9 |
| -3 | 6.5 |
| -2 | 5 |
| -1 | 4.5 |
| 0 | 5 |
| 1 | 6.5 |

2.

| x | y |
|----|----|
| 24 | 2 |
| 16 | 3 |
| 12 | 4 |
| 8 | 6 |
| 6 | 8 |
| 4 | 12 |

3.

| x | y |
|----|-----|
| -2 | 1/9 |
| -1 | 1/3 |
| 0 | 1 |
| 1 | 3 |
| 2 | 9 |
| 3 | 27 |

4. $f(x) = 2.2(0.2^x)$

5. $f(x) = \frac{2}{x-2}$

6. $f(x) = 2\sqrt{x-2}$

7. $f(x) = (2x)x^2$

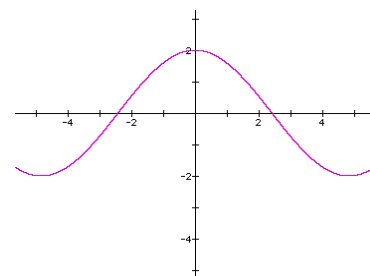
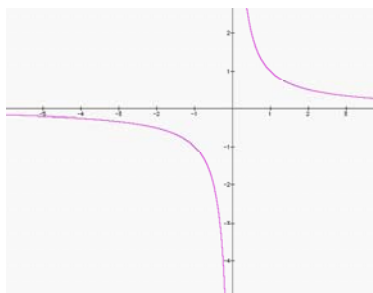
8. $f(x) = \frac{(x-2)^2}{2}$

9. $f(x) = (2) - 2x$

10. _____

11. _____

12. _____



Complete (fill in) the tables for the type of function indicated.

13. Linear

| x | y |
|---|----|
| 1 | |
| 2 | |
| 3 | 8 |
| 4 | |
| 5 | 16 |

14. Inverse Variation

| x | y |
|---|---|
| 2 | |
| 3 | |
| 4 | |
| 6 | |
| 8 | 3 |

15. The formula $E = mv^2$ tells how to find the energy, E , when the mass, m , and the velocity, v , are known. If m represents the mass of a ball bat and v the velocity of the ball struck by the bat, which requires more energy: to use a bat twice as heavy or to double the velocity of the ball? *Explain your answer.*

16. You and your friends order pizza and have it delivered to your house. The restaurant charges \$9.99 per pizza plus a \$1.50 delivery fee. Write the specific model that gives the cost as a function of the number of pizzas ordered.

17. You bought an antique table for \$500, and the value of the table is supposed to increase by about 5% each year. Write a specific growth model for the value of the table as a function of the years.

Given the compound interest model, $12560 = 9500\left(1 + \frac{0.07}{12}\right)^{12 \cdot 4}$ (each answer worth 1 point)

18a. What is the Principal invested? _____

18b. What is the yearly interest rate? _____

19a. What is the compounding period (how often is interest calculated)? _____

19b. How many years will interest be added in this model? _____

In lab 10, you found a sinusoidal model for a sound wave. Suppose your model was: $y = 100 \sin(220\pi x)$

20. What is the frequency of the sound if the period is the reciprocal of the frequency? _____

21. How would changing the 220 to 440 in the model affect what you hear? _____

(no affect, louder, softer, higher note, lower note)

Matching: Match the function on the left with its graph on the right.

_____ 22. $f(x) = -0.5x + 4$

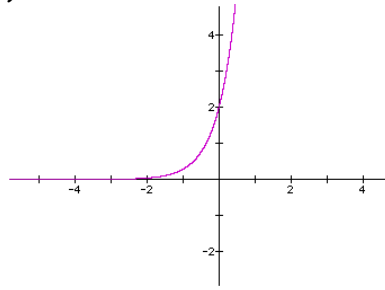
_____ 23. $f(x) = 2 \cdot 7^x$

_____ 24. $f(x) = -2 \cdot 7^x$

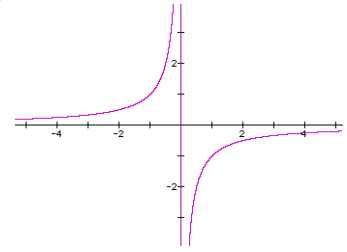
_____ 25. $f(x) = \frac{-1}{x}$

_____ 25. $f(x) = -4x^2 + 1$

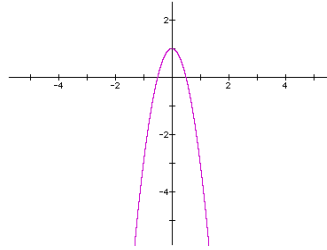
a)



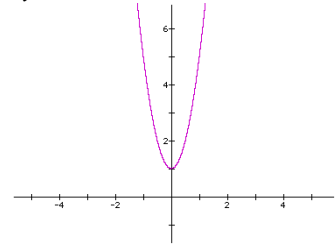
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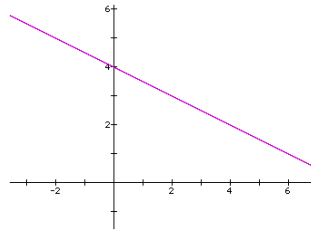
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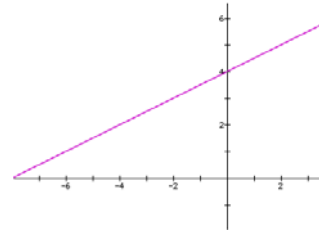
d)



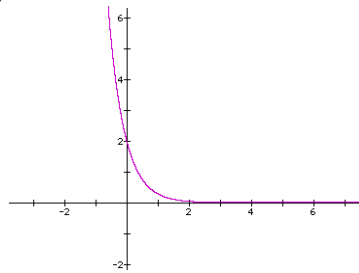
e)



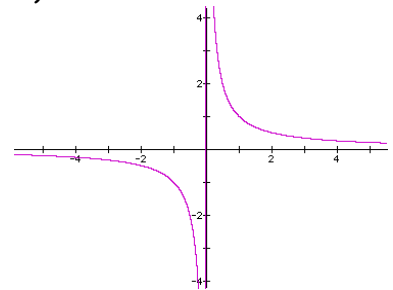
f)



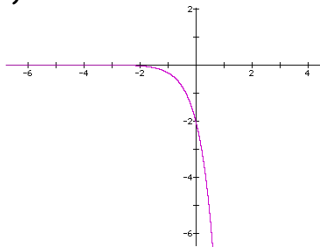
g)



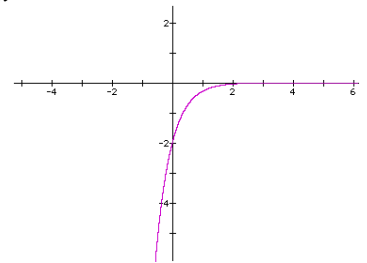
h)



i)



j)



Unit 2 TEST MATH 117
100 points Spring 2006

NAME: _____
LAB T.A. (Circle one) O-Yeat Rosona Antonios

DIRECTIONS: Part II (48 points) requires a graphing calculator. If the problem asks for an explanation or showing work, you will get only partial credit for an answer without work. Tear off last page for scratch paper. (Each of the following problems worth 2 points unless stated otherwise.)

The number of revolutions (r) of two pulleys is inversely proportional to their diameters (d).

Suppose a 24-inch-diameter pulley makes 400 revolutions per minute.

27. Write the specific model that gives r as a function of d , i.e., $r(d)$.

28. If this pulley is belted to an 8-inch-diameter pulley, find the number of revolutions per minute of the smaller pulley. *Show how you get your answer.*

The value of a bond purchased for \$24,900 increases by 10% per year.

29. Write an exponential growth model for the value of the bond as a function of years.

30. After about how many years will the bond be worth twice its purchase price?

Briefly show how you use the model to find the answer and state the answer.

31. What is the bond worth after $2\frac{1}{2}$ years?

Summarize the calculator strokes to get the answer, and state the answer.

32. What model do you think **best** describes this function? Explain why you chose it.

| x | y |
|----|----|
| -2 | -1 |
| 0 | 0 |
| 2 | 1 |
| 6 | 3 |

33. Determine the specific model for the data, based on your choice.

The table gives mean weight w (in kilograms) and age x (in years) of Atlantic cod from the Gulf of Maine.

| | | | | | | | | |
|-----|-------|-------|-------|-------|-------|-------|-------|--------|
| x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| w | 0.751 | 1.079 | 1.702 | 2.198 | 3.438 | 4.347 | 7.071 | 11.518 |

34. Is an exponential model a good fit for the original data? If you answer yes, then find the specific exponential model. If you answer no, then explain your reasoning.

35. Would a quadratic model fit this data? If you answer yes, then find the specific quadratic model. If you answer no, then explain your reasoning.

36. Estimate the weight of a cod that is 9 years old using the model you think fits the data best.

The table shows the average speed y (in feet per second) of a space shuttle for different times x (in seconds) after launch.

| | | | | | | | | |
|-----|-------|-------|-------|-------|--------|--------|--------|--------|
| x | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| y | 202.4 | 463.4 | 748.2 | 979.3 | 1186.3 | 1421.3 | 1795.4 | 2283.5 |

37. Find a linear model for the data, and state R^2 . (worth 3 points)

38. Using your linear model, approximately what is the speed 120 seconds after launch? Show what you do to get your answer.

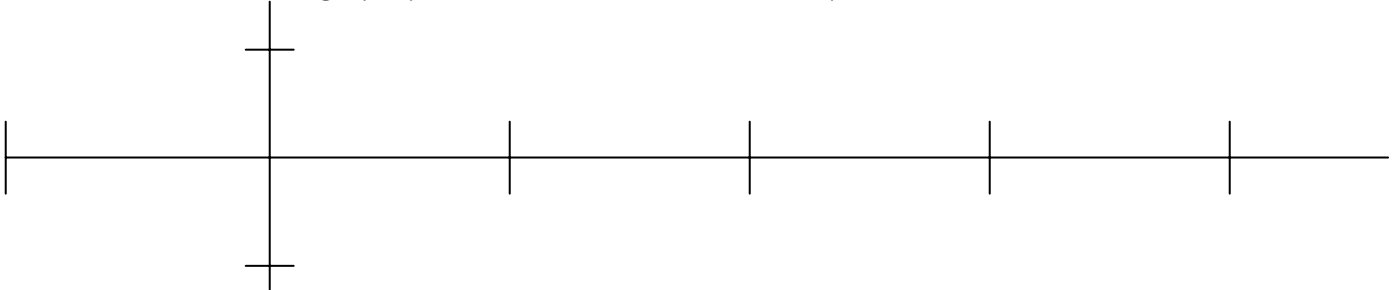
39. When the space shuttle reaches a speed of approximately 4400 feet per second, its booster rockets fall off. Use your linear model to determine how long after launch this happens. Show what you did to get your answer.

40. A lever pivots on a support called a fulcrum. For a balanced lever, the distance d (in feet) an object is from the fulcrum varies inversely with the object's weight w (in pounds). An object weighing 140 lbs. is placed 6 feet from a fulcrum. How far from the fulcrum must a 112-pound object be placed to balance the lever?

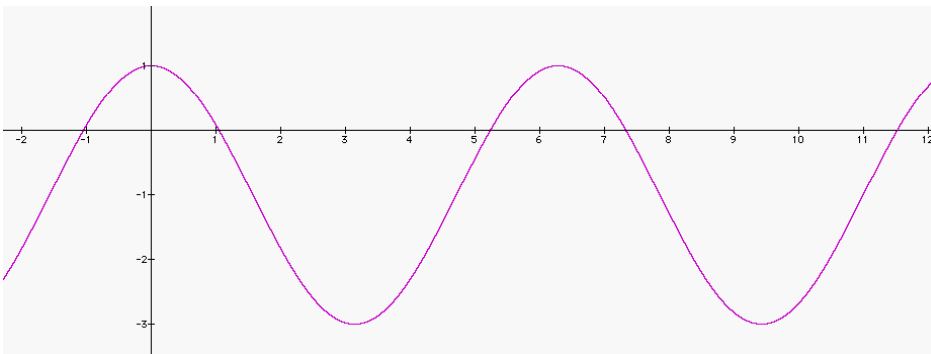
The table shows the number s of stores owned by a company from 1987 to 1998 where x represents the number of years since 1987.

| | | | | | | | | | | | | |
|-----|----|----|----|----|-----|-----|-----|-----|-----|------|------|------|
| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| y | 17 | 33 | 55 | 84 | 116 | 165 | 272 | 425 | 676 | 1015 | 1412 | 1900 |

41. Write a specific linear model for the data. State R^2 . (worth 3 points)
42. Write a specific exponential model for the data. State R^2 . (worth 3 points)
43. Write a specific quadratic model for the data. State R^2 . (worth 3 points)
44. Is an inverse variation a possible model for this data? *Explain why or why not.*
45. Which model do you think best fits the data? *Explain.*
46. Use the model that best fits the data to predict how many stores there will be in 2006.
47. On the axes below, graph: $y = 0.5 \sin 2\pi x$ Be sure to label your axes increments.



48. Give the sinusoidal function for the following graph. _____



You may use this page for scratch paper.