

I. Functions and Graphs

Match each function in this list with one of the 14 graphs to the right. Do not use a graphing calculator.

1. _____ $f(x) = \text{constant}$

2. _____ $f(x) = mx + b, m \neq 0$

3. _____ $f(x) = x^2$

4. _____ $f(x) = x^3$

5. _____ $f(x) = \sqrt{x}$

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

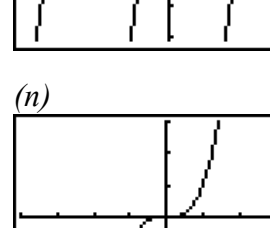
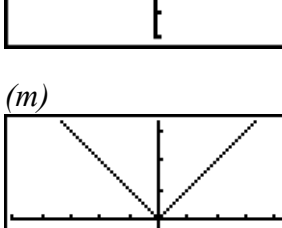
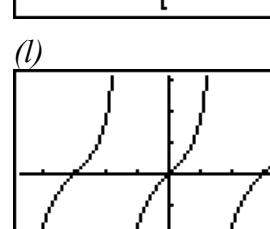
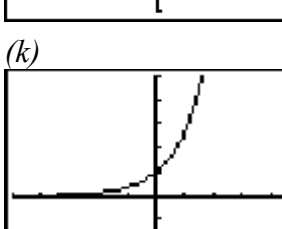
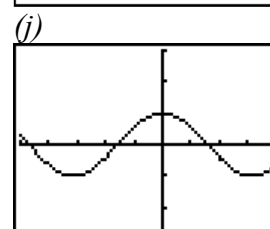
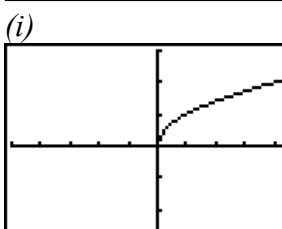
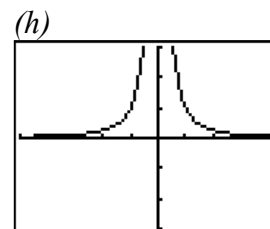
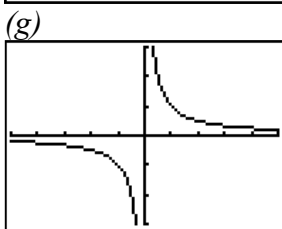
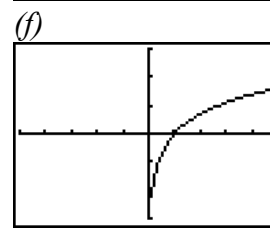
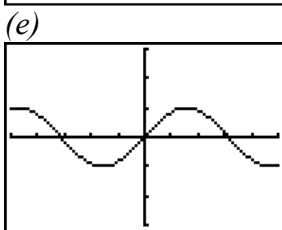
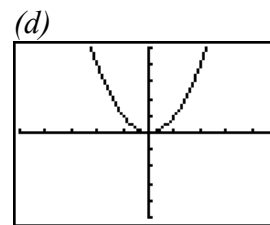
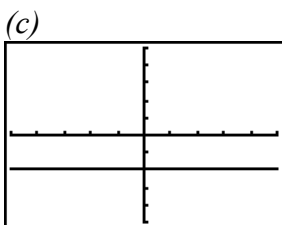
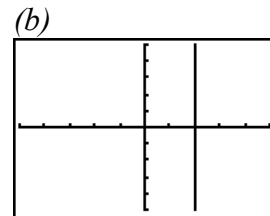
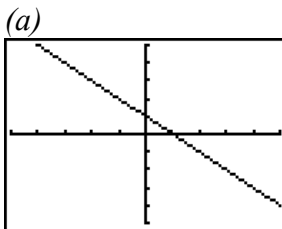
7. _____ $f(x) = |x|$

8. _____ $f(x) = e^x$

9. _____ $f(x) = \ln x$

10. _____ $f(x) = \sin x$

11. _____ $f(x) = \cos x$



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II. Finding a Mathematical Model

1. The approximate cost of a 30-second commercial during the Super Bowl, in thousands of dollars, is shown in the chart.

Year	1975	1980	1985	1990	1995	1997
Cost in \$1000	110	275	500	923	1131	1200

- (a) Graph the data on your calculator. To do this, follow the instructions in parts A and B on the handout **USING THE STATISTICAL FEATURES OF THE TI-83/83+/84/84+**
- (b) The graph should look approximately linear. Choose two points, find the equation of the line, and then graph the line on your calculator along with the data to see if the line is a good fit for the data.
- (c) What is the slope of the line you found in part (b)? What does it represent?
- (d) Fitting a linear equation to data in order to model the relationship between two variables is called linear regression. To use your calculator to find a better linear regression line than the one you found in part (b), follow the instructions in part C of the statistical features handout. The calculator uses a method that involves all of the data, not just two points.
- (e) Although the cost of a 30-second Super bowl commercial did appear to be somewhat linear in the data given above, costs have risen more rapidly recently, as seen in the following table. Cost is given in thousands of dollars.

Year	1975	1980	1985	1990	1995	1997	2000	2002	2004	2006	2008	2009
Cost	110	275	500	923	1131	1200	2100	2000	2250	2500	2700	3000

Enter the new data in your calculator and calculate a new regression line. Is it a good fit?

- (f) To find a function that is a better fit for the data, use your calculator to find a quadratic function, a cubic function, and an exponential function. Which one is the best fit?

quadratic:

cubic:

exponential:

- (g) Use the function in part (f) that was the best fit to predict the cost of a 30-second Super Bowl commercial this year.