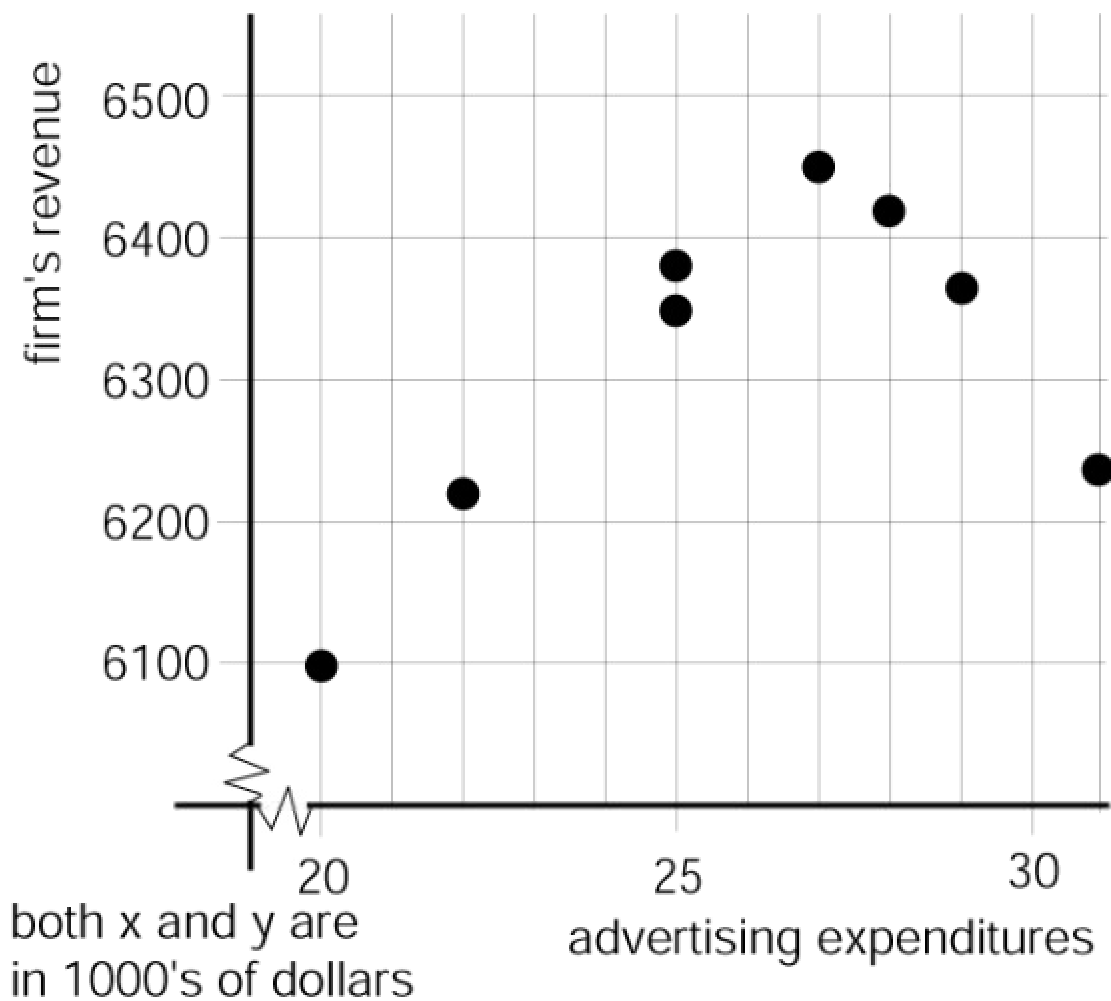**Quadratic regression on your calculator**   NAME:

Notice the points on the scatter plot have a quadratic pattern. We will find the quadratic function that best fits this pattern. It will be of the form $y = ax^2 + bx + c$ like $y = -2x^2 + 4x + 10$.

The following graph shows the relationship between the money spent on advertising and the revenue of a certain firm. Roughly draw in a parabola that mimics the pattern of the points. We will use our calculator to find the one quadratic function that fits the pattern best.

We'll need to enter the data into our calculator, draw a scatter plot and look at its pattern, and then find the regression equation that fits the data. We'll follow up by graphing both the scatter plot and the regression function together.

The worksheet "Linear regression on your calculator" describes in more detail the menus we will use.

Let's enter the data. Remember we need a statistical function so we enter the **STAT** menu.

On the **TI83** or **TI82**, the **STAT** button is to the left of the arrows, beneath the **DEL** key.

On the **TI86**, the **STAT** function is the second function of the **plus** button.

On the **TI85**, the **STAT** button is directly right of the **GRAPH** button.

The table below shows the coordinates of the points from the scatter plot. Select **EDIT** from the **STAT** menu and enter the data. (Remember *x* and *y* are in thousands of dollars but do not worry about that.)

On the **TI86**, remember to put 1's in the **fStat** column along with each point.

x (advertising expenditures)	*y* (firm's revenue)
20	6,101
22	6,222
25	6,350
25	6,378
27	6,453
28	6,423
29	6,360
31	6,231

Let's draw a scatter plot on the calculator. Exit out of the data entry screen.

On the **TI83** or **TI82**, select **STATPLOT**. It's the second function of the **y=** button. Highlight **Plot1** and press **ENTER**. Turn it **On,** make sure the first little graph (that looks like a scatter plot) is highlighted and it has **L1** and **L2** selected for **Xlist** and **Ylist**. Go to the **ZOOM** menu and select **ZoomStat**.

On the **TI86**, select **PLOT** from the **STAT** menu. Select **PLOT1** by pressing **F1**. Turn it **On** and make sure it reads "**Xlist Name=xStat**" and "**Ylist Name=yStat**". Exit to the home screen. Go to the **ZOOM** menu (within **GRAPH**) and select **ZDATA**.

On the **TI85**, set the **RANGE** to [15, 35] x [6000, 6500]. Then select **DRAW** from the **STAT** menu. Select **SCAT** from the **DRAW** menu. Press **EXIT** once to reduce your menus so you see more of the screen.

Now let's calculate the regression equation. Get back to the **STAT** menu.

On the **TI83** or **TI82**, while on the **STAT** menu, arrow over to **CALC**. Select **QuadReg** from the list. This puts the expression **QuadReg** on the home screen. Press **ENTER** to have it calculate it. Round your coefficients to two decimal places. What is the regression equation?

On the **TI86**, select **CALC** from the **STAT** menu. You'll need to press **MORE** to get over to that option. It will put the expression **P2Reg** on the home screen. Press **ENTER** to calculate the equation. You'll need to arrow over to see the coefficients of your equation. They are given in the form {a b c}where the equation is $y = ax^2 + bx + c$. Round the coefficients to two decimal places. What is the regression equation?

On the **TI85**, select **CALC** from the **STAT** menu. Accept "**Xlist Name=xStat**" and "**Ylist Name=yStat**" by pressing **ENTER** twice. Then select **P2REG** from the list. You'll need to press **MORE** to get over to that option. You'll need to arrow over to see the coefficients of your equation. They are given in the form {a b c}where the equation is $y = ax^2 + bx + c$. Round the coefficients to two decimal places. What is the regression equation?

Let's graph the regression function on top of our scatter plot to see how well it mimics the pattern. Get to the **y=** editor. Place your cursor in the space for **y1**.

On the **TI83** or **TI82**, press the **VARS** button. Select **Statistics** from the **VARS** menu. Arrow over to **EQ** and select **RegEQ**. Then press **GRAPH**.

On the **TI86**, open the **STAT** menu and select **VARS**. Press **MORE** until you can select **RegEq**. Press **EXIT** twice to get back to the **GRAPH** menu and select **GRAPH**.

On the **TI85**, open the **STAT** menu and select **VARS**. Press **MORE** until you can select **RegEq**. Press **EXIT** twice to get back to the **GRAPH** menu and select **GRAPH**. Then reenter the **STAT** menu, select **DRAW** and **SCAT**. Press **EXIT** to reduce your menus for a better look.