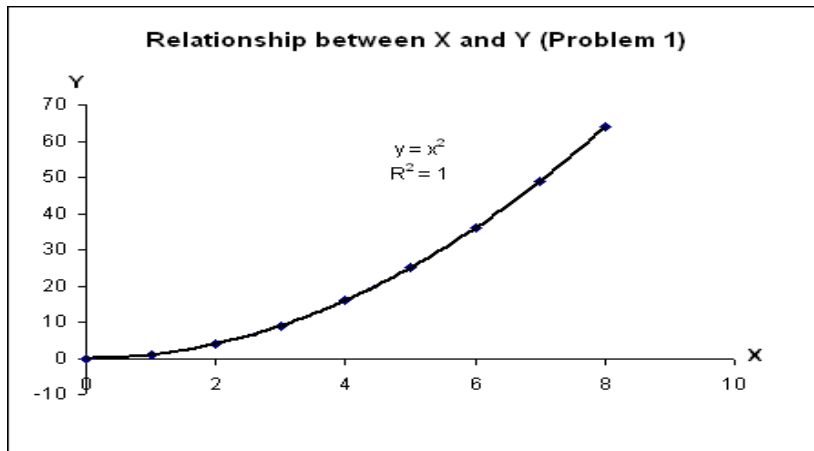


1. Show the relationship between the two variables X and Y:

X	0	1	2	3	4	5	6	7	8
Y	0	1	4	9	16	25	36	49	64

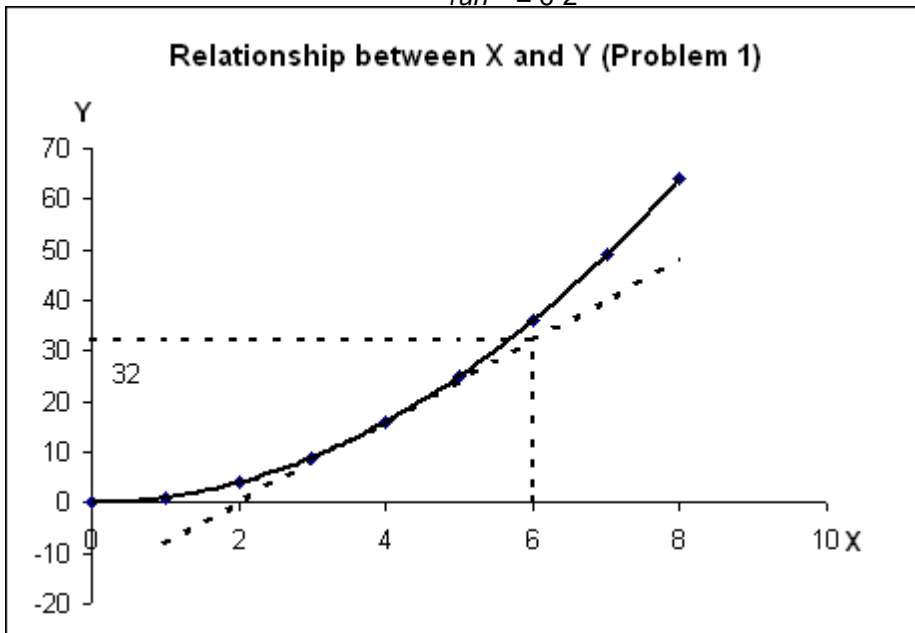


- a. the relationship is **positive, non-linear, and convex.**
- b. The ARC slope between X=3 and X=4 is 7 (see below)

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{16-9}{4-3} = \frac{7}{1} = 7$$

- c. The slope of the relationship at X=4 is 8 (see graph below for Parkin's method)

$$\frac{\text{rise}}{\text{run}} = \frac{32}{6-2} = 8$$

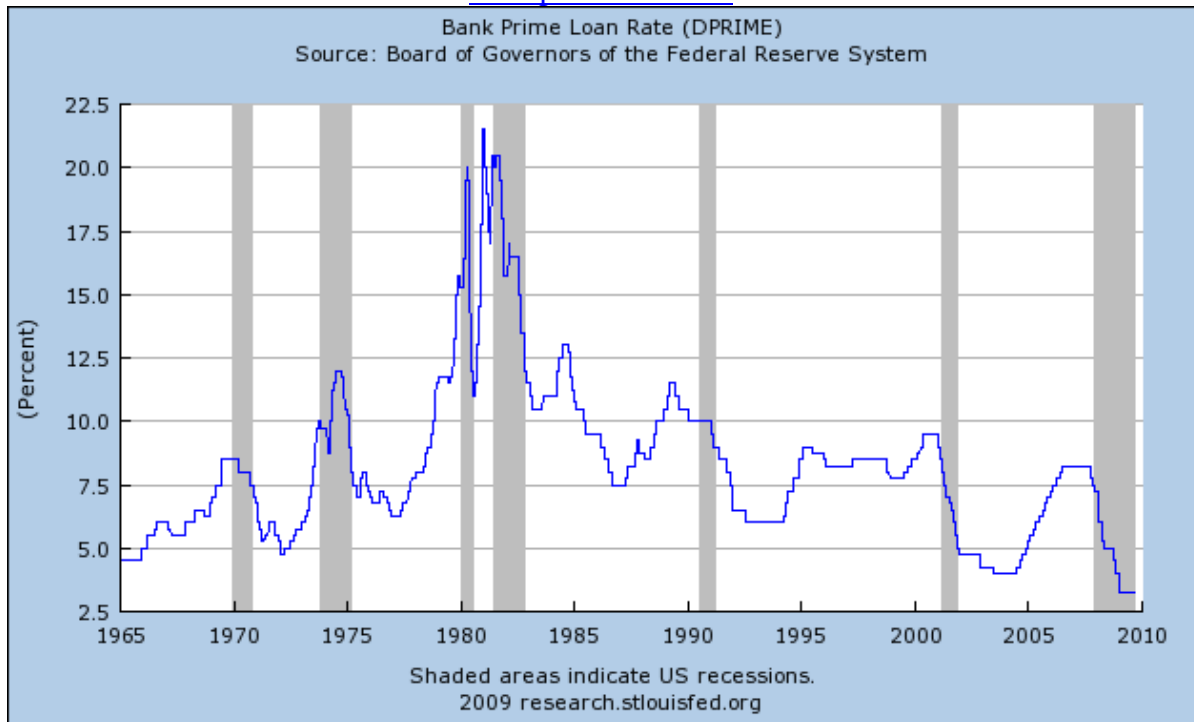


EXTRA CREDIT (**MUCH EASIER!**): the 2-order polynomial inserted using EXCEL (shown above) has an R2 of 1 (100%), so we're very confident THIS is the equation.

the equation is $Y = x^2$

the derivative of Y wrt X is $2X$ when X is 4, $2X = 8$

2. The graph below is from the website <http://research.stlouisfed.org/fred2/series/DPRIME?cid=117>
Click here for the definition of the “[bank prime loan rate.](#)”



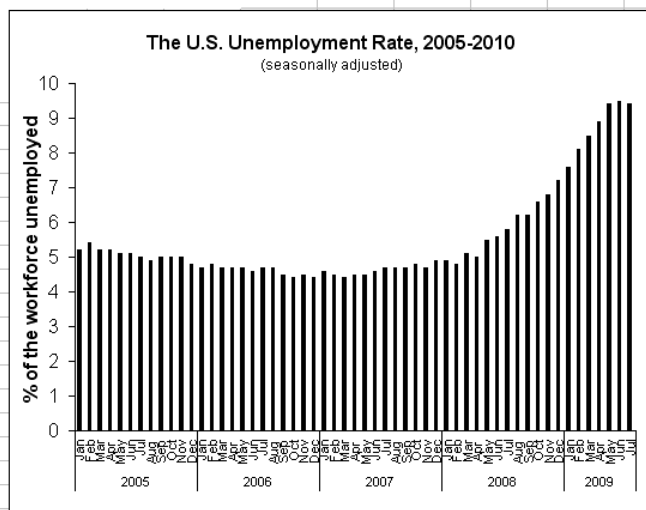
We can learn from this graph of bank prime loan rates in the U.S. over the past 45 years that:

- (i) the prime loan interest rate usually varies between 5% and 10%
- (ii) right now, the prime loan rate at around 3% is lower than it has ever been since 1965
- (iii) the prime loan rate was the highest (up to 21%) in the early 1980's (before the recessions)
- (iv) Every recession (indicated by a grey bar) has followed a local peak in the prime loan rate. But not every prime rate peak was followed by a recession: not after the rise in 1984, 1988, or 1995.
- (v) there were recessions every 5-7 years before 1990, then just a short recession in 2002 (after 9/11). (Maybe because we hadn't had cyclical recessions recently, we did not expect this one, either?)
- (vi) in the past, most recessions lasted less than a year.
- (vii) the current recession since 2008 is already the longest recession our country has experienced during the past 45 years.

data source:

<http://research.stlouisfed.org/fred2/series/UNRATE/downloaddata>

year	month	seasonally adjusted unemployment rate
		%
2005	Jan	5.2
	Feb	5.4
	Mar	5.2
	Apr	5.2
	May	5.1
	Jun	5.1
	Jul	5.0
	Aug	4.9
	Sep	5.0
	Oct	5.0
	Nov	5.0
	Dec	4.8
2006	Jan	4.7
	Feb	4.8
	Mar	4.7
	Apr	4.7
	May	4.7



3. b. MAX&MIN: The US unemployment rate is **currently the highest** – about **10%** - and it was 9.5% in this past June. It was **as low as 4.4%** **three times in the past five years**: October '06, December '06, and March '07.
- c. TRENDS: The unemployment rate has usually been about 5%. It trended steadily upward from the end of 2007 until the summer of 2009. It appears to have stabilized now between 9%-10%.
- d. The average unemployment rate has been 5.5% over the past five years. At about 10% now, it is almost twice as high as average.
- e. Because the unemployment rate is no longer trending upward, this summer might have been a turning point – our economy may have stopped receding. But data just documents the past. It cannot tell the future.

4. Consumer demand (D) at each market price (P) is summarized by the equation $D = 10 - 2P$.

Supply (S) at each price (P) is given by the equation $S = -2.5 + 2.5P$.

a. The equilibrium price is the P that equates these two equations:

$$10 - 2P = -2.5 + 2.5P$$

$$12.5 = 4.5P$$

$$2.78 = P$$

b. The equilibrium quantity can be found as either D or $10 - 2(2.78) = 4.44$

c. The (INVERSES of the) two equations are graphed below:

slope -0.5 0.4
intercept 5.0 1.0

Q	P demand	P supply	P*	Q*	
0	5.0	1.0	2.78	4.44	0
1	4.5	1.4	2.78	4.44	1
2	4.0	1.8	2.78	4.44	2
3	3.5	2.2	2.78	4.44	2.78
4	3.0	2.6	2.78		
5	2.5	3.0	2.78		
6	2.0	3.4	2.78		
7	1.5	3.8	2.78		
8	1.0	4.2	2.78		
9	0.5	4.6	2.78		
10	0.0	5.0	2.78		

