Graphing functions: An example with a demand function.

October 4, 2018

These were prepared to prepare you for the first midterm in 2010.

Assume, for example, the following demand function for ski days at the Steamboat ski area.

$D_{sb} = 20 + .03(snow_{sb}) - .06p_{sb} + .01p_{vail}$

where D_{sb} is the individual's demand, this year, for Steamboat ski days.

$snow_{sb}$ is Steamboat's total snow fall, last year, in inches

p_{sb} is the cost of a steamboat ski day, measured in dollars

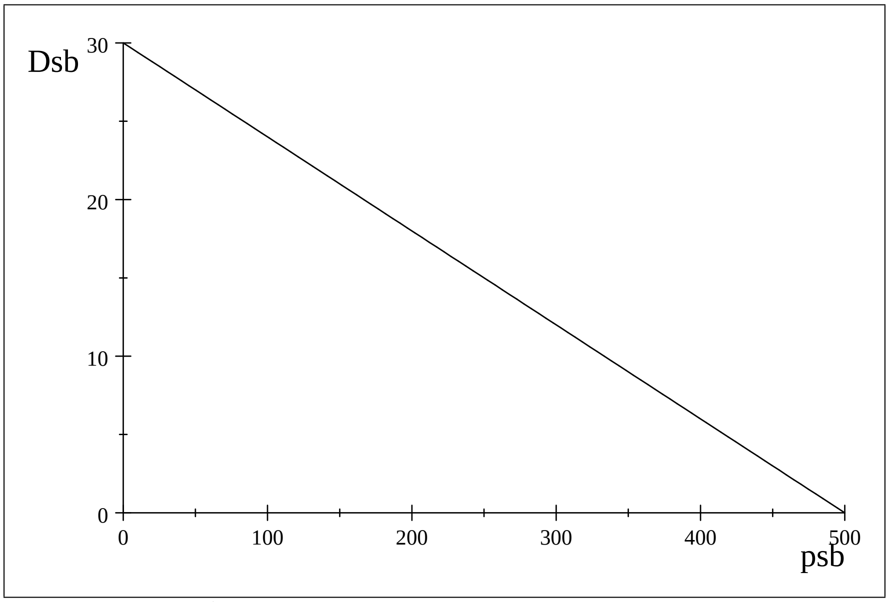
p_{vail} is the cost of a vail ski day day, measured in dollars.

Given this demand function, how many days will the individual ski if it cost nothing to ski at SB or Vail and last year SB got 500 inches of snow?

How many fewer days will the individual ski SB if the cost of skiing SB increases to $50/day?

Graph the demand function with D_{sb} on the vertical axis and p_{sb} on the horizontal axis, **assuming** $snow_{sb} = 300$ and $p_{vail} = 100$.

In this case the demand function is
$D_{sb} = 20 + .03(300) - .06p_{sb} + .01(100) = 30.0 - 0.06p_{sb}$



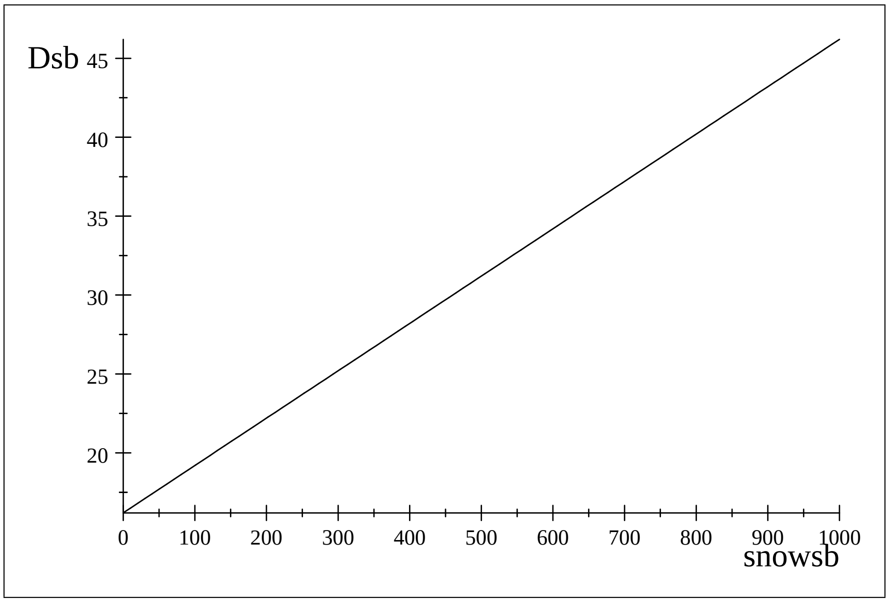
D_{sb} as a function p_{sb} assum. $snow_{sb} = 300$ and $p_{vail} = 100$

Could I have graphed this function if I had not speficied numerical values for $snow_{sb}$ and p_{vail}? No.

Figure out exactly how this graph is affected if $snow_{sb}$ 400 inches rather thand 300 inches. If p_{vail} is \$120 rather than \$100.

Now graph the demand function with D_{sb} on the vertical axis and $snow_{sb}$ on the horizontal axis, assuming $p_{sb} = 80$ and $p_{vail} = 100$

$D_{sb} = 20 + .03(snow_{sb}) - .06(80) + .01(100) = 16.2 + 0.03 snow_{bs}$



D_{sb} as a function of $snow_{sb}$ assum. $p_{sb} = 80$ and $p_{vail} = 100$

What does this demand function (demand as a function of snowfall) tell us?

What would this curve do if p_{sb} increased from \$80 to \$120?

Now graph the first restricted demand function, $D_{ssb} = 30.0 - 0.06p_{sb}$, but with \$ on the vertical axis and ski days on the horiziontal axis.

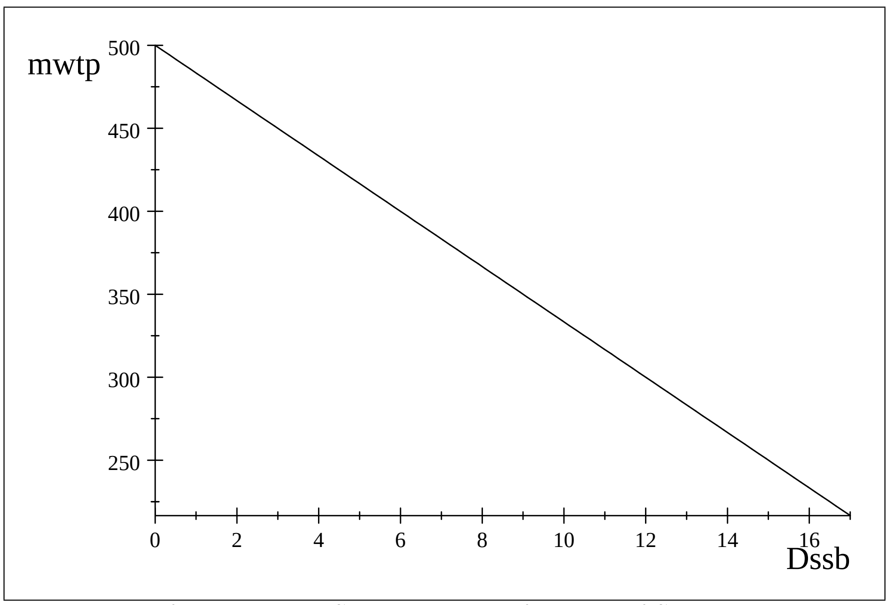
(flip the paper)

if $D_{sb} = 30.0 - 0.06p_{sb}$ then solving for p_{sb}
$p_{sb} = 500.0 - 16.667D_{ssb}$ – price as a function of quantity rather than quantity as a function of price.

Written this way, the demand function is often called the "inverse demand function" or the *mwtp* (marginal *wtp* function). We typically simply call them demand functions.

The individual would pay for \$500 for the his first SB ski but \$500 − \$16.667 for his second ski day and \$500 − \$16.667 − \$16.667 for his third SB ski day.

Graphing the inverse demand function

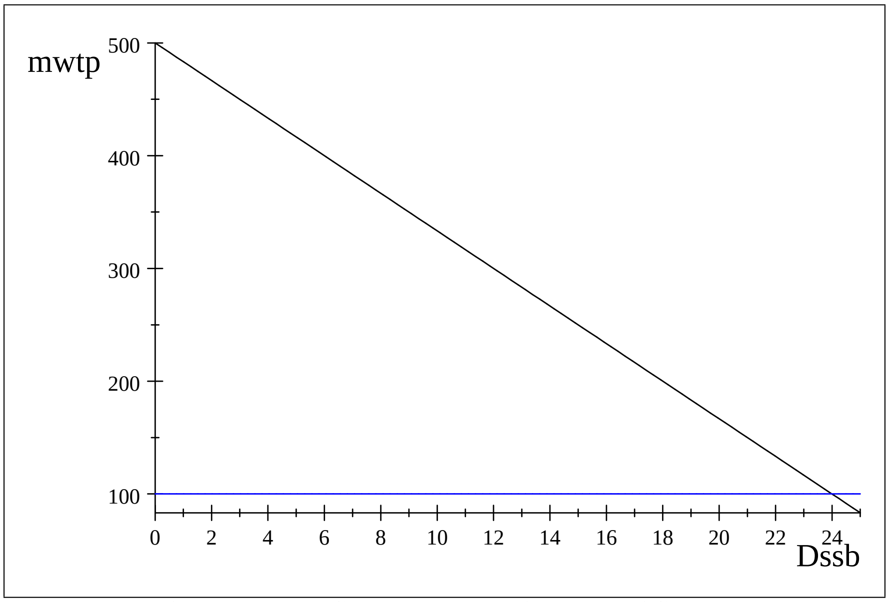


mwtp for additional SB ski day as a function of SB ski days.

So, it looks like the first day, given what's constant, is around \$500, so he would get a net benefit of \$500 minus his cost from his first day of SB skiing. But, by about the 20th day, he is sick of the place.

So, let's calculate how much CS our individual gets from the availablity of SB given its cost \$100/day to ski SB

You do the calculation.



mwtp for additional SB ski day as a function of SB ski days.

How would this mwtp curve shift is $snow_{sb}$ decreased from 300 to 100?

How would his CS from being able to ski SB given it cost $100/day if snow decreases from 300 to 100?

You do the calculation.

When you are through with these notes you should be able to graph D_{ssb} or p_{sb} as function of any of the other variables, and be able to figure out how that graph would shift is something not graphed changes value.

The T.A.s are making up some specific questions of our demand function for SB ski days.