_____Name

According to the single-site travel cost model, a consumer maximizes the following utility function

$$max_{x,v}U(x,v,q)$$

subject to a budget constraint

$$wL = x + p_0v$$

and a time constraint

$$T = L + (t_t + t_v)v$$

where v is the number of visits to the outdoor recreation site in question, x is a basket of market goods (where price of x is unity), q is the level of site quality, p_0 is the out-of-pocket expenses associated with a single trip to the site, L is the number of hours worked by the consumer (at wage w), T is the number of hours the consumer devotes to work and site visits, t_t is the travel time associated with a single round trip visit, and t_v is the on-site time associated with one trip.

a.) (5 points) Show that the budget and time constraints can be simplified to the following single constraint

$$wT = x + p_vv$$

where p_v is the total price of a site visit and is equal to out-of-pocket expenses plus the opportunity cost of the consumer's time. That is, p_v is equal to

$$p_0 + w(t_t + t_v)$$

Substitute in for L in the budget constraint

$$w(T - (t_t + t_v)v) = x + p_0v$$

$\Rightarrow \quad wT = x + [p_0 + w(t_t + t_v)]v$
$\Rightarrow \quad wT = x + p_vv$

where $p_v = p_0 + w(t_t + t_v)$

b.) (5 points) The above maximization problem can be solved to yield the following demand function for visits to the site:

$$v = f(p_v, q, wT).$$

Suppose demand shifts due to an increase in site quality. Show graphically 1.) the increase in the number of site visits and 2.) the increase in consumer surplus due to the increase in site quality.