1.a) See isp.tgz  
  
Shortest Path: ISPs are irrelevant when computing routes based on mileage; each mileage cost is factored into the distance-vector, regardless of which ISP sent us the update. Each distance segement is appended to the overall mileage of the route as the update is propagated.   
  
Cost: each ISP chooses its route *locally* based on how much profit it will make by sending traffic over the route. We look at the cost of the *entire* path: for any transitions from ourselves into an intermediary ISP, we add $.50 to the cost of the route, for any transitions from an intermediary to us (where we are not the destination) we subtract $.50 from the cost route, and for any segment of the path the traverses our network, we add $d to the cost of the route. We use a *path vector* routing algorithm, not distance vector, which enables us to examine the entire path in this manner.  
  
b) Here’s our example:  
NorthBridge in Hong Kong, China -> PacifiCircle in Hong Kong, China -> PacifiCircle in Vancouver, Canada -> Comcast in Vancouver, Canada -> Comcast in San Diego, CA. Cost of route: $1.16, 7558 miles.  
  
NorthBridge in Hong Kong, China -> PacifiCircle in Hong Kong, China -> PacifiCircle in San Diego, CA -> Comcast in San Diego, CA. Cost of route: $1.14, 7350 miles.

It was more cost effective for PacifiCircle to pass off to ComCast in SanDiego rather than passing it off in Vancouver, even though the mileage was less. (hmm, this isn’t a great example. Oh well)

c) Average Difference = ~890 miles

Figure : Distances ordered from smallest to largest

d) Using EconCost as a distance metric is better for profit than using the ShortestPath metric.

Figure : Profit to the source ISP ordered from smallest to largest

EconCost seems to make better profit for those paths that only from one ISP to another, either with or without transitions inside of each ISP. This is because if a source ISP will try to get the route to the closest POP of the destination ISP to the source ISP’s source POP, regardless of physical distance.