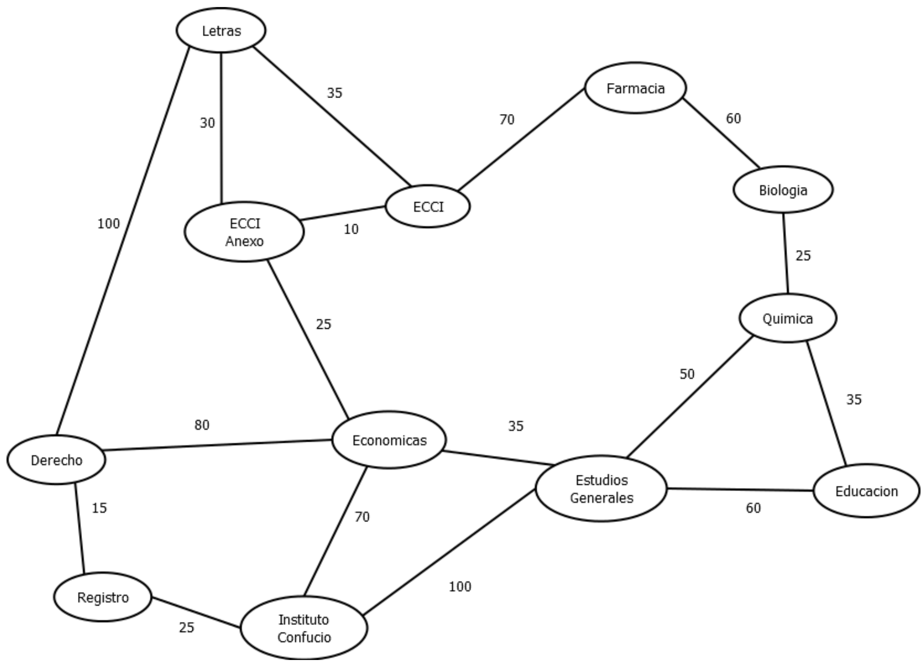
1. **A* on a finite graph:** I was playing with the cat in front of the biology building, and lost track of time. Help me find the shortest path to my office in ECCI Anexo with A* using the map and heuristic below. How long is this path?



Educacion	110
Quimica	100
Biologia	95
Derecho	90
Registro	85
Instituto Confucio	75
Farmacia	60
Estudios Generales	50
Economicas	20
Letras	17
ECCI	5
ECCI Anexo	0

2. **A* heuristics:** Define a heuristic for problem 1, with which A* will *not* yield the optimal solution.

3. **A* on an infinite graph:** Using the infinite graph shown in class (slide 30), define a heuristic if the goal is to find a node which is a multiple of 100, and then use it to search for a goal

starting from node 48.

4. **A* on graph representing sentences** Consider the following graph: Each node represents a sentence, as a – potentially empty – sequence of words. Additionally, we require that a sentence contains no duplicate words. We have the following words in our dictionary: "cats", "dogs", "cuter", "than", "are". Each node can produce its neighbors by adding single words to the sentence (that are not already present), or removing single words from the sentence, preserving the order. For example "dogs cats are" and "than dogs cats are" are neighbors, but "dogs cats are" and "than dogs are cats" are not. Start with the sentence "cats are dogs", and use A* to find a path to "cats are cuter than dogs". Use the number of words that differ from the goal as the heuristic, and the number of letters a word adds/removes as the cost.

5. **Graph representation:** Define a graph that represents traveling to a vacation destination, starting after packing the luggage. What are the nodes and what do they represent? What are the edges? What could pathfinding be used for on this graph?

6*. **Bonus points:** Show that the heuristic on slide 32 satisfies this property of consistent heuristics: For all nodes n, consider all neighbors m. The value of the heuristic satisfies $h(n) \leq c(n, m) + h(m)$, where $c(n, m)$ is the (actual) cost of moving from n to m.