AI first lecture

1 Goal trees

Solving the integral $\int \frac{-5x^4}{(1-x^2)^{5/a}} dx$ reduce the problem into one of smaller forms that we can solve with memorization.
We use **Problem reduction** to solve problems such as this, with the following transformations:

- Safe transformations
  - $\int -f(x) = -\int f(x)$
  - Pull out the constants
  - Sum of the integrals is the integral of the sum
  - If the degree of numerator is greater than degree of denominator, divide it out
- Heuristic transformations
  - $f(sin(x), cos(x), tan(x), cot(x), sec(x), cos(x)) = g(cos(x), sin(x)) = g_2(tan(x), cosec(x)) = g_3(cotan(x), sec(x))$
  - $\int f(tan(x))dx = \int \frac{f(y)}{1+y^2} dy$
  - $1 - x^2, x = sin(y), 1 + x^2 = x * tan(y)$

- Apply all safe transformations
- Look in the table, see if we are done, report sucess if yes

And node: what happens when we split a problem into multiple problems that we must solve.
Or node: can be solved one of two different ways, we don't care which is which
These nodes are in a tree called a problem reduction tree, goal tree, and or tree
To decide between things to integrate in an or: measure the depth of funcitonal composition
Procedure for solving:

1. apply all safe tranformations
2. look in the table, see if we are done
3. find a problem, apply heurisitc transform
4. Go back to step 1