Student's affirmation: I certify that I have neither taken help in completing this exam nor helped anyone else with this exam. I have never discussed this exam with anyone other than the instructor and TA. I have not used ChatGPT, Llama, or other AI tools to create or influence my solutions.

(Signature) _____

Mandatory: Affirmation and signature on the first page; name on every page; submission as PDF.
If you make assumptions about any problem, state them, but be prepared to justify why they were necessary.

Problem	1	2	3	4	5	6	Total
Points:	5	25	15	10	25	20	100
Score:							

This exam has 6 problems, for a total of 100 points.

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1. (5 points) Consider the following prompt given to a large language model to label news headlines.

   > Your are a news analyst. Identify whether the news headline below indicates war journalism or peace journalism, and explain your answer:

   Indicate two shortcomings with this prompt, explaining each in about 20 words.

2. Consider the sentence "Vermeer painted a girl wearing a pearl earring with a brush."

   Where possible use only the dependency relations specified in the textbook and copied in our lecture notes. If you need to go beyond that list, make a case for doing so but don't assume I will accept the extension.

   (a) (12 points) Show a *projective* dependency parse tree for (some interpretation of) this sentence. Explain the corresponding interpretation. Show a series of shift-reduce moves of the Arc Standard Parser through which this parse could be created, or explain that no shift-reduce sequence can produce this parse.

   (b) (13 points) Show a *nonprojective* dependency parse tree for (some interpretation of) this sentence. Explain the corresponding interpretation. Show a series of shift-reduce moves of the Arc Standard Parser through which this parse could be created, or explain that no shift-reduce sequence can produce this parse.

3. (15 points) Consider the following based on https://en.wikipedia.org/wiki/United_States_v._Google_LLC_(2023).

   > 1 The Justice Department recommends a breakup of Google's business units like Chrome and Android
   >
   > 2 The ruling against Google is a significant win for antitrust enforcement in the U.S., setting a precedent for how the government might tackle monopolistic practices in the tech industry
   >
   > 3 Following the filing of the lawsuit, the DOJ claimed it has documentation that would bolster its case
   >
   > 4 Judge Leonie Brinkema denied Google's request to move the lawsuit from the District Court for the Eastern District of Virginia to a venue in New York
   >
   > 5 Google's lead attorney Karen Dunn countered by saying that people use Google's products simply due to the fact that they are "simple, affordable, and effective"

   Identify each occurrence of the thematic roles listed in Figure 21.1 of the textbook, which is reproduced in the course slides with examples. That is, show each verb and for each verb its various thematic roles.

4. (10 points) Show each element of FrameNet's *Change Position on a Scale* (Figure 21.3 of the textbook) in the following text (simplified from https://csimarket.com/stocks/compet_glance.php?code=SAVE):

   "Spirit Airlines Inc reported Revenue decrease in the 3 quarter 2024 year on year by -4.88%, despite the revenue increase by the most of its competitors of 2.43%, recorded in the same quarter."

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5. Consider the following text, mainly from Richard Dawkins, *Science in the Soul* and https://en.wikipedia.org/wiki/Karl_von_Frisch (with modifications).

> 1 It is well-known that Karl Ritter von Frisch (20 November 1886–12 June 1982) was an ethologist.
>
> 2 He received the Nobel Prize in Physiology or Medicine in 1973, along with Nikolaas Tinbergen and Konrad Lorenz.
>
> 3 The convention he discovered, studying bee behavior, is that the upward direction on the comb in the vertical plane stands for the sun's direction in the horizontal plane.
>
> 4 A dance with the straight run 30° to the right of the vertical on the comb tells the other bees: Leave the hive and fly at an angle 30° to the right of the sun.
>
> 5 Well, that is remarkable enough, and when Karl von Frisch first discovered it, his colleagues found it hard to believe.
>
> 6 But it is true.
>
> 7 And it gets even better, and this brings us back to the sense of time.
>
> 8 There's a problem with using the sun, our neighborhood star, as a reference point.
>
> 9 It moves.

Explain each answer briefly, taking about 60–80 words for all parts.

(a) (5 points) Identify all noun phrases in this passage that may be referents.

(b) (10 points) Identify all coreference clusters based on this passage.

(c) (10 points) Identify all phrases that are appositives, predicate nominals, expletives or pleonasts, clefts, extrapositions, numerics, or embedded in larger mentions. (Some categories may have no matches.)

6. Consider the following text, extracted from Richard Dawkins, *Science in the Soul* (with modifications).

> 1 Since the dance is performed on the vertical comb, whereas the angle of the food is in the horizontal plane, there has to be a convention.
>
> 2 The convention is that the upward direction on the comb in the vertical plane stands for the sun's direction in the horizontal plane.
>
> 3 A dance with a straight run straight up the comb tells the other bees to leave the hive and fly dead towards the sun.
>
> 4 A dance with the straight run 30° to the right of the vertical on the comb tells the other bees: Leave the hive and fly at an angle 30° to the right of the sun.
>
> 5 Von Frisch tried the experiment of trapping the bees in his observation hive for several hours.
>
> 6 They went on dancing.
>
> 7 But he noticed something which really is almost too good to be true.
>
> 8 As the hours advanced, the dancing bees slowly turned the direction of the straight run of their dance, so that it would continue to tell the truth about the direction of the food, compensating for the changing position of the sun.
>
> 9 And they did this, even though they were dancing inside the hive and therefore couldn't see the sun.
>
> 10 They were using their internal clocks to compensate for what they knew would be the changing position of the sun.

(a) (4 points) Show the direct and indirect realizations for each utterance.

(b) (10 points) Show C_b, C_f, and C_p for each utterance in a table with one row for each utterance.

(c) (4 points) Show the resulting centering transitions in a table with one row for each utterance.

(d) (2 points) Are the conclusions regarding the transitions (and the imputed discourse coherence) reasonable? If so, explain. Otherwise, explain how you would alter the method to produce more acceptable results.