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- Print your name in the space provided below.
- There are 10 questions. The maximum score is 200.
- The grading of each question will take into account whether you obtained a correct solution and how well you presented your analysis and justified your logic. In most cases, as much weight will be given to the presentation and explanation of your logic as to whether the solution is fully correct. Legibility will be strongly considered in the grading. You may ask for scratch paper to work out your solution before finalizing it on the exam.
- Externalize! Whether it's a drawing, a table, an equation or something else, externalize! And make the externalization explicit in your answer! Label things for clarity!
- You may use the supplied extra paper for scratch work. Write your name on any scratch work sheets you use and turn those in with your exam.
- All final answers must be written on the test form itself.
- When you have finished, sign the pledge at the bottom of this page and turn in the test.
- This is a closed-book, closed-notes examination.
- No laptops, calculators, cell phones or other electronic devices may be used during this examination.
- Until solutions are posted, you may not discuss this examination with any student who has not taken it.
- Failure to adhere to any of these restrictions is an Honor Code violation.

Name (Last, First) _____ print

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Pledge: *On my honor, I have neither given nor received unauthorized aid on this examination.*

_____ *signed*

1. [20 points] Analogies

Which pair of words fits best in the blanks?

For each analogy problem below, give the answer, and also give an appropriate relationship sentence that demonstrates a valid analogy relationship while ruling out the other answers.

City is to mayor as _____ is to _____.

- a. president : country
- b. government : business
- c. senate : congress
- d. business : manager

2. [20 points] Verbal Analogy

In a city known as the Big Carrot, streets that begin with a vowel and end with a consonant run east-west while those that begin with a consonant and end with a vowel run north-south. Other streets can go either way. A car driving north makes a left turn. Is it now traveling parallel or perpendicular to Eric Street? Write a clear, well-organized explanation of your solution. Use visualization / externalization technique to show your reasoning.

3. [20 points] Problem Solving in Large Concepts

A number of structured techniques are available for breaking mental roadblocks. They are referred to as “blockbusting techniques”. Name (at least four) and explain them.
(Hint: refer to generate solution slides for the answer)

4. [25 points] Problem Solving in Large Concepts

What is “fishbone diagram”? What is its usage? Explain.
(Hint: refer to generate solution slides for the answer)

5. [20 points] Problem Definition Techniques

Carry out a present state/desired state analysis and prepare a Dunker diagram for the following problem:

“I want a summer internship but no one is hiring.”

6. [30 points] Kepner-Tregoe Approach

It is 12:45 am; you have just been alerted that the *EXXon Valdez* tanker has run aground on the Bligh Reef and is spilling oil at an enormous rate. By the time you arrive at the spill, 6 million gallons of oil have been lost and the oil slick extends over an area of more than 1 square mile.

A meeting with the emergency response team is called. At the meeting, someone suggests that second tanker be dispatched to remove the remaining oil from the *EXXon Valdez*. Unfortunately, the number of damaged compartments from which oil is leaking is not known at this time and there is concern that if the tanker slips off the reef, it could capsize if the oil is removed from only the compartments on the damaged side.

Someone else suggests using chemical dispersant (i.e. soap-like substance), which would break up the oil into drops and cause it to sink. However, it is not known if sufficient chemical is available to cover a spill of this magnitude. A marine biologist at the meeting also objects to the use dispersants, stating that once these chemicals are in the water, they would be taken by the fish and thus be extremely detrimental to the fishing industry.

The use of floatable booms to surround and contain the oil also inspires a heated discussion. Because of the size of the spill, there is not enough boom material even to begin to surround the slick. The Alaskan governor's office says the available material should be used to surround the shore of a small village on a nearby island. The Coast Guard argues that the slick is not moving in that direction, insisting that the boom material should be used to contain or channel the slick movement in the fjord. The Department of Wildlife says the first priority is the four fisheries, which must be protected by the boom or else the fishing industry will be depressed for years – or perhaps even generations- to come. A related issue is that millions of fish were scheduled to be released from the fisheries into the oil-contaminated fjord two weeks from now. Other suggestions as to where to place the boom material were also put forth at the meeting.

Carry out a K.T. situation appraisal for the *Exxon Valdez* spill.

8. [10 points] Deductive Reasoning

If 6 days ago was Wednesday, what is the second letter after the second letter in 2 days after tomorrow?
Use visualization and externalization technique to show your reasoning.

9. [15 points] Lateral Thinking

The below figure shows how, given three matches, you can make a triangle. With six matches, make four triangles all the same size as the one shown in the figure.



10. [15 points] PseudoCode / Algorithm

Write an algorithm (in Pseudo language) that takes a list of numbers, and displays odd numbers in the list along with their sum.

In writing pseudocode, use the notation we practiced in class.

