Name: ____

1. (1 pt.)
   - **Read all material carefully.**
   - *If in doubt whether something is allowed, ask, don't assume.*
   - You may refer to your **books, papers, and notes** during this test.
   - **E-books** may be used *subject to the restrictions* noted in class.
   - **Computers** (including smart phones, tablets, etc.) **are not permitted**, except when used strictly as e-books or for viewing ones own notes.
   - Calculators are not required but are permitted.
   - **Network access** of any kind (cell, voice, text, data, ...) is **not permitted**.
   - Write, and draw, carefully. **Ambiguous or cryptic answers receive zero credit.**
   - Use **class and textbook conventions** for notation, algorithmic options, etc.
   - **Do not attach or remove any pages.**

Write your name in the space provided above.
Do not write anything else on this page.

WAIT UNTIL INSTRUCTED TO CONTINUE TO REMAINING QUESTIONS.

(Do not view any other pages.)

Do not write on this page.

(It is for use in grading only.)

Q	Full	Score
1	1	
2	19	
3	10	
4	15	
total	45	

2. (19 pts.) Trace the execution of the BOTTOM-UP-CUT-ROD(p, n) algorithm for $n = 10$ and the following pricing array:

length:	1	2	3	4	5	6	7	8	9	10
price:	3	2	7	10	10	15	20	18	25	24

Depict the state of the array r at least at the following three points during the execution:

(a) At the bottom of the outer loop in the iteration with $j = 3$.
(b) As above, but with $j = 6$.
(c) At the very end of the algorithm.

It is a good idea to show more of the intermediate steps and work, but those are not strictly required. (Depicting only the states of the array is sufficient.)

[additional space for earlier material]

3. (10 pts.) Solve the following recurrences. *Clearly state the methods you use for your solutions and outline their important steps.* (Show your work; otherwise there is no credit.) [Hint: No calculator is needed, although it is permitted.]

   (a) $T(n) = 8T(n/4) + 3n^2 + 17n + 32$

   (b) $S(n) = 8S(n/3) + 3n^{2.65} - 2.65$

[additional space for earlier material]

4. (15 pts.) Using the textbook's Figure 2.3 (page 37) as a model depict the operation of the textbooks' MERGE algorithm when invoked as

$$\textsc{Merge}(A, 6, 9, 12)$$

where A is an array with the following elements (in index order, *starting with index 1*, following the textbook's conventions):

i:	1	2	3	4	5	6	7	8	9	10	11	12
A_i:	3	1	4	9	4	7	8	9	12	3	5	10

Indicate the **values of the variables** i, j, and k, by placing those labels at the correct position (as the textbook does). You do not need to indicate the colors as used in that figure.

Depicting **three iterations** of the first while loop in the pseudocode is sufficient.

Reminder: Follow all graphical, pictorial, notational, and algorithmic conventions of the textbook exactly.

[additional space for earlier material]