



## AP<sup>®</sup> Computer Science AB 2002 Sample Student Responses

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ABA A

Complete function BitsToWord below.

```
apstring CodeTree::BitsToWord(const apstring & code) const
// precondition: code is a string of 0's and 1's representing
//               a valid encoded word
// postcondition: returns decoded word for code
{
    apstring result = " ";
    Node *p = myRoot;
    int i;
    for (i = 0; i < code.length(); i++)
    {
        if (code[i] == "0")
            p = p -> left;
        else
            p = p -> right;
        if (p -> left == NULL)
        {
            result = result + p -> letter;
            p = myRoot;
        }
    }
    return result;
}
```

GO ON TO THE NEXT PAGE.

Complete function CharToBitsHelper below.

```
apstring CodeTree::CharToBitsHelper(char ch, Node * T,
                                     const apstring & pathSoFar) const
// postcondition: if ch is in subtree T, returns code for ch
{
    if (T->left == NULL)
    {
        if (T->letter == ch)
            return pathSoFar;
        else
            return "";
    }

    apstring result;
    result = CharToBitsHelper(ch, T->left, pathSoFar + "0");
    if (result != "")
        return result;
    result = CharToBitsHelper(ch, T->right, pathSoFar + "1");
    return result;
}
```

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ABA B

Complete function BitsToWord below.

```

apstring CodeTree::BitsToWord(const apstring & code) const
// precondition: code is a string of 0's and 1's representing
// a valid encoded word
// postcondition: returns decoded word for code
{
    int len = code.length();
    for (int x = 0; x < len; x++)
    {
        if (code[x] == '0')
        {
            ptr = ptr->left;
        }
        else
        {
            ptr = ptr->right;
        }

        if (ptr->left && !ptr->right)
        {
            temp += ptr->letter;
            ptr = myRoot;
        }
    }
    return temp;
}

```

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Complete function CharToBitsHelper below.

```
apstring CodeTree::CharToBitsHelper(char ch, Node * T,
                                     const apstring & pathSoFar) const
// postcondition: if ch is in subtree T, returns code for ch
```

{

~~CharToBitsHelper(ch, T->left, pathSoFar + '0');~~

if (T)

{

if (T->left && !T->right && T->info == ch)

return pathSoFar;

CharToBitsHelper(ch, T->left, pathSoFar + '0');

CharToBitsHelper(ch, T->right, pathSoFar + '1');

}

}

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ABA C

Complete function BitsToWord below.

```
apstring CodeTree::BitsToWord(const apstring & code) const
// precondition: code is a string of 0's and 1's representing
//               a valid encoded word
// postcondition: returns decoded word for code
{
    Node *position = myRoot;
    apstring Word = ""; key = code;

    while (key != "")
    {
        if ((position->left == NULL) && (position->right == NULL))
        {
            Word += position->letter;
            position = myRoot;
        }
        else
        {
            if (key[0] == '0')
                position = position->left;
            else
                position = position->right;
        }
        key = key.substr(1, key.length()-1);
    }
    return Word;
}
```

GO ON TO THE NEXT PAGE.

Complete function CharToBitsHelper below.

```
apstring CodeTree::CharToBitsHelper(char ch, Node * T,  
                                     const apstring & pathSoFar) const  
// postcondition: if ch is in subtree T, returns code for ch
```

```
{  
    if (T->letter == ch)  
        return pathSoFar;  
  
    else  
        return (CharToBitsHelper(ch, T->left, pathSoFar + '0')  
                || CharToBitsHelper(ch, T->right, pathSoFar + '1'));  
}
```

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