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For the question 1,
The DTD A is as below:

```
<!DOCTYPE Proj3 [

<!ELEMENT Proj3 (student+)>
<!ELEMENT student (course+)>
<!ELEMENT course (name+, grade+)>
<!ELEMENT name (#PCDATA)>
<!ELEMENT grade (#PCDATA)>

<!ATTLIST student name CDATA #REQUIRED>
]>
```

The xml file I use to validate is as below:

```
<?xml version="1.0" encoding="UTF-8"?>
<Proj3>
	<student name="Scarlet Overkill">
		<course>
			<name>CSE462</name>
			<grade>4</grade>
		</course>
		<course>
			<name>CSE486</name>
			<grade>3.6</grade>
		</course>
		<course>
			<name>CSE396</name>
			<grade>3</grade>
		</course>
	</student>
	<student name="Gru">
		<course>
			<name>CSE462</name>
			<grade>3.4</grade>
		</course>
		<course>
			<name>CSE486</name>
			<grade>2.8</grade>
		</course>
		<course>
			<name>CSE250</name>
```

```
            <grade>3.4</grade>
        </course>
    </student>
    <student name="Dru">
        <course>
            <name>CSE462</name>
            <grade>3.2</grade>
        </course>
        <course>
            <name>CSE486</name>
            <grade>2.7</grade>
        </course>
        <course>
            <name>CSE396</name>
            <grade>2.7</grade>
        </course>
    </student>
    <student name="Bob the Minion">
        <course>
            <name>CSE396</name>
            <grade>2</grade>
        </course>
        <course>
            <name>CSE479</name>
            <grade>3</grade>
        </course>
    </student>
    <student name="Herb Overkill">
        <course>
            <name>CSE396</name>
            <grade>4</grade>
        </course>
    </student>
</Proj3>
```

For the question 2:
The result of validating with t1.txt and the dtd A, (I put the dtd A on the top of the xml file but below the line of <?xml version="1.0" encoding="UTF-8"?>):
No errors were found.

For the result of validating with t2.txt and the dtd A, (I put the dtd A on the top of the xml file but below the line of <?xml version="1.0" encoding="UTF-8"?>):
Line 10:2 The markup declarations contained or pointed to by the document type declaration must be well-formed.

```
2   <!DOCTYPE Proj3 [
3
4   <!ELEMENT Proj3 (student+)>
5   <!ELEMENT student (course+)>
6   <!ELEMENT course (name+, grade+)>
7   <!ELEMENT name (#PCDATA)>
8   <!ELEMENT grade (#PCDATA)>
9
10  <student name="HULK">
11    <course>
12      <name>CSE462</name>
13      <grade>A</grade>
```

10:2 The markup declarations contained or pointed to by the document type declaration must be well-formed.

An error has been found!

Click on to jump to the error. In the document, you can point at with your mouse to see the error message.
Errors in the XML document:

	10:	2	The markup declarations contained or pointed to by the document type declaration must be well-formed.

XML document:

```
1   <?xml version="1.0" encoding="UTF-8"?>
2   <!DOCTYPE Proj3 [
3
4   <!ELEMENT Proj3 (student+)>
5   <!ELEMENT student (course+)>
6   <!ELEMENT course (name+, grade+)>
7   <!ELEMENT name (#PCDATA)>
8   <!ELEMENT grade (#PCDATA)>
9
10  <student name="HULK">
11      <course>
12          <name>CSE462</name>
```

For the q3a:
(I have also included this on the q3a.txt)
for $c in doc("/db/Forhw3/t1.xml")/Proj3/student/course
where $c/name = "CSE462"
return (<res>{string($c/../@name)}, {data($c/grade)}</res>)
The result with existdb is:

```
<res>Scarlet Overkill, 4</res>
2
<res>Gru, 3.4</res>
3
<res>Dru, 3.2</res>
```

The screenshot is as below on the next page:

```
for $c in doc("/db/Forhw3/t1.xml")/Proj3/student/course
where $c/name = "CSE462"
return (<res>{string($c/../@name)}, {data($c/grade)}</res>)
```

/db/test

Adaptive Output Live Preview Highlight Index Matches

```
<res>Scarlet Overkill, 4</res>
<res>Gru, 3.4</res>
<res>Dru, 3.2</res>
```

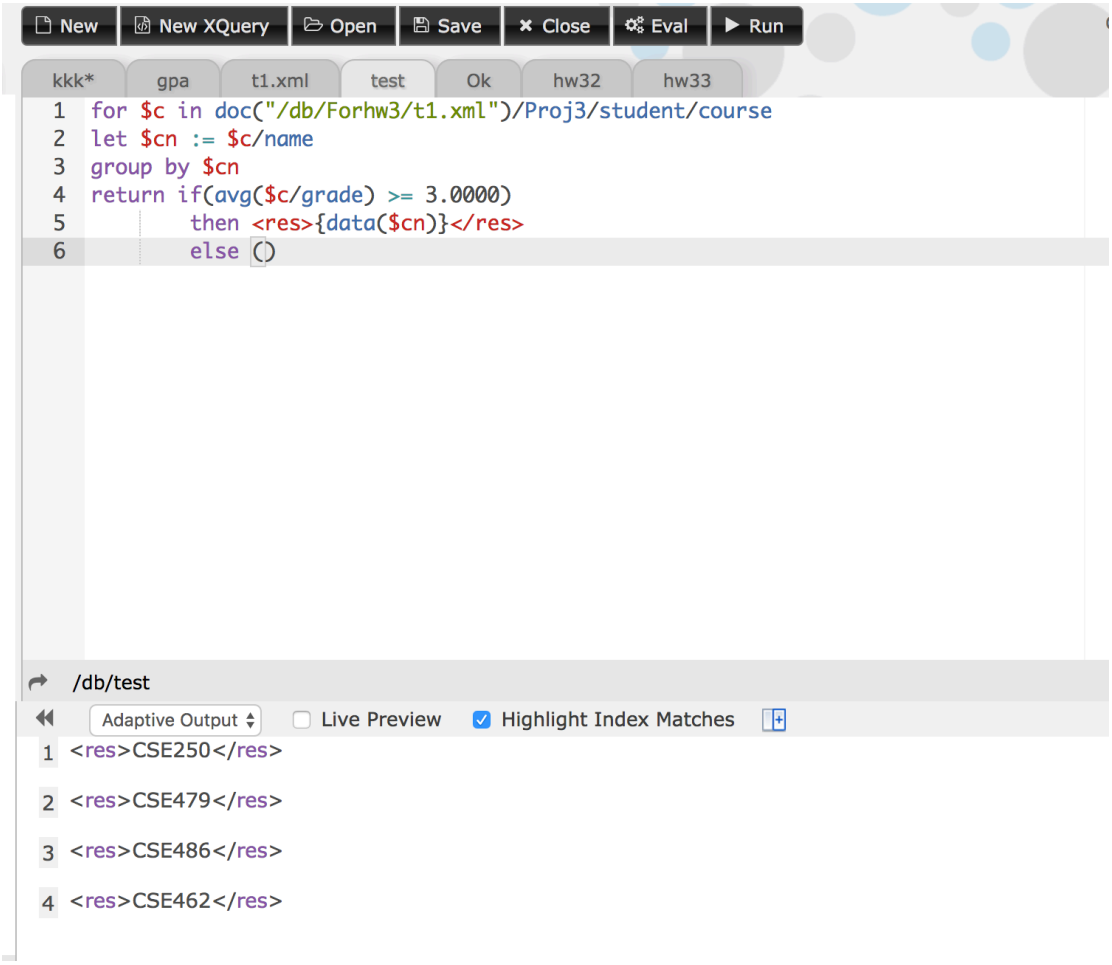
For the q3b:
(I have also written this on the q3b.txt)

```
for $c in doc("/db/Forhw3/t1.xml")/Proj3/student/course
let $cn := $c/name
group by $cn
return if(avg($c/grade) >= 3.0000)
        then <res>{data($cn)}</res>
        else ()
```

The result is:

```
<res>CSE250</res>
2
<res>CSE479</res>
3
<res>CSE486</res>
4
<res>CSE462</res>
```

The screenshot is as below on the next page:



And for the extra credit, the dtd B is:
<!DOCTYPE courses [

<!ELEMENT courses (course+)>
<!ELEMENT course (student*)>
<!ELEMENT student (grade+)>
<!ELEMENT grade (#PCDATA)>

<!ATTLIST course name CDATA #REQUIRED>
<!ATTLIST student name CDATA #REQUIRED>
]>
The qextra is:
<courses>{
for $cn in distinct-values(doc("t1.xml")//course/name)
return <course name="{$cn}"> {for $s in //student
return if($s/course/name = $cn)

```
          then (<student
name="{data($s/[@name])}"><grade>{data($s/course[name=$cn]/grade)}</g
rade></student>)
          else ()}
          </course>
}</courses>
```

(I have included the above into the qextra.txt)