Data Modeling and Databases: Assignment 8

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1 Part A

1.
```
create or replace function fizzbuzz()
returns void as $$
declare i integer;
begin
        for i in 1..100 loop
                if (i%3!=0 and (i%5!=0))then
                        raise notice '%', i;
                        end if;
                if (i%3=0 and (i%5=0)) then
                        raise notice '%','fizzbuzz';
                end if;
                if (i%3=0 and (i%5!=0)) then
                        raise notice '%','fizz';
                end if;
                if (i%3!=0 and (i%5=0)) then
                        raise notice '%','buzz';
                end if;
        end loop;
end;
$$ language plpgsql;
```

2.
```
create or replace function roman_to_int(roman varchar)
returns integer as $$
declare i integer;romans varchar[]; arabic integer[];answer integer;prev int
begin
        romans=array ['I','V','X','L','C','D','M'];
        arabic=array [1,5,10,50,100,500,1000];
        i=1;
        if (length(roman)=1) then
```

```
                return roman_char_to_int(substring(roman,1,1));
        end if;
        prev=roman_char_to_int(substring(roman,1,1));
        i=2;
        answer=0;
        while (i<=length(roman)) loop
                curr=roman_char_to_int(substring(roman,i,1));
                if (prev<curr) then
                        answer=answer+curr-prev;
                        i=i+2;
                        prev=0;
                        raise notice '%',answer;
                else
                        answer=answer+prev;
                        prev=curr;
                        i=i+1;
                end if;
        end loop;
        return answer+prev;
end;
$$ language plpgsql;

create or replace function roman_char_to_int(roman char)
returns integer as $$
declare i integer;romans varchar[]; arabic integer[];answer integer;
begin
        romans=array ['I','V','X','L','C','D','M'];
        arabic=array [1,5,10,50,100,500,1000];
        answer=0;
        for i in 1..7 loop
                if (roman=romans[i]) then answer=arabic[i];
                end if;
        end loop;
        if (answer=0) then
                raise exception 'Invalid input';
        end if;

        return answer;
end;
```

3. ```
   create or replace function int_to_roman(roman integer)
   returns varchar as $$
   declare i integer;romans varchar[]; arabic integer[];answer varchar;
   begin
           if (roman<1) then
                   raise exception 'Invalid input';
   ```
   ```

```
        end if;
        romans= ARRAY['I','IV','V','IX','X','XL','L','XC','C','CD','D','CM',
        arabic=ARRAY[1,4,5,9,10,40,50
        ,90,100,400,500,900,1000];
        i=13;
        answer=null;
        while (i>=0) loop
                if (roman>=arabic[i]) then
                        answer=concat(answer,romans[i]);
                        roman=roman-arabic[i];
                        i=i+1;
                end if;
                i=i-1;
        end loop;
        return answer;
end;
$$ language plpgsql;
```

4.
```
create or replace function r_add(r1 varchar, r2 varchar)
returns varchar as $$
declare i integer;
begin
        i=roman_to_int(r1)+roman_to_int(r2);
        if (i>3000) then
                raise exception 'Result more than 3000';
        end if;
        return  int_to_roman(i);
end;
$$ language plpgsql;

create or replace function r_sub(r1 varchar, r2 varchar)
returns varchar as $$
declare tmp integer;
begin
        tmp=roman_to_int(r1)-roman_to_int(r2);
        if (tmp<=0) then
                raise exception 'Result less than 0';
        end if;
        return int_to_roman(tmp);
end;
$$ language plpgsql;
```

2 Part B

1.
   - **Answer:** $\{AB\}^+ = \{ABCDED\}$
     Reason: AB (A $\rightarrow$ D)
     ABD (A $\rightarrow$ E)
     ABDE (D $\rightarrow$ C)
     ABDEC (D $\rightarrow$ F)
     ABDECF=ABCDEF
   - No,No
   - Yes, Yes
2.
   - Yes, No
   - Yes, Yes
3.
   - No, No
   - {BD,ABCE}
   - A $\rightarrow$ BC, E $\rightarrow$ A, CD $\rightarrow$ E, B $\rightarrow$ D ($\{ABD\}^+ = \{ABCDE\}$)
   - Yes
   - {BD,ABCE}