INF1339 Fall 2019. Midterm Problem Set

Instructions. This is a solo effort – once you look at it, you may not consult with other humans about it. You may, however, consult any resource – notes, books, webpages, videos – that you might find useful. The answers to all questions should be submitted via Quercus.

1. Are the logical expressions

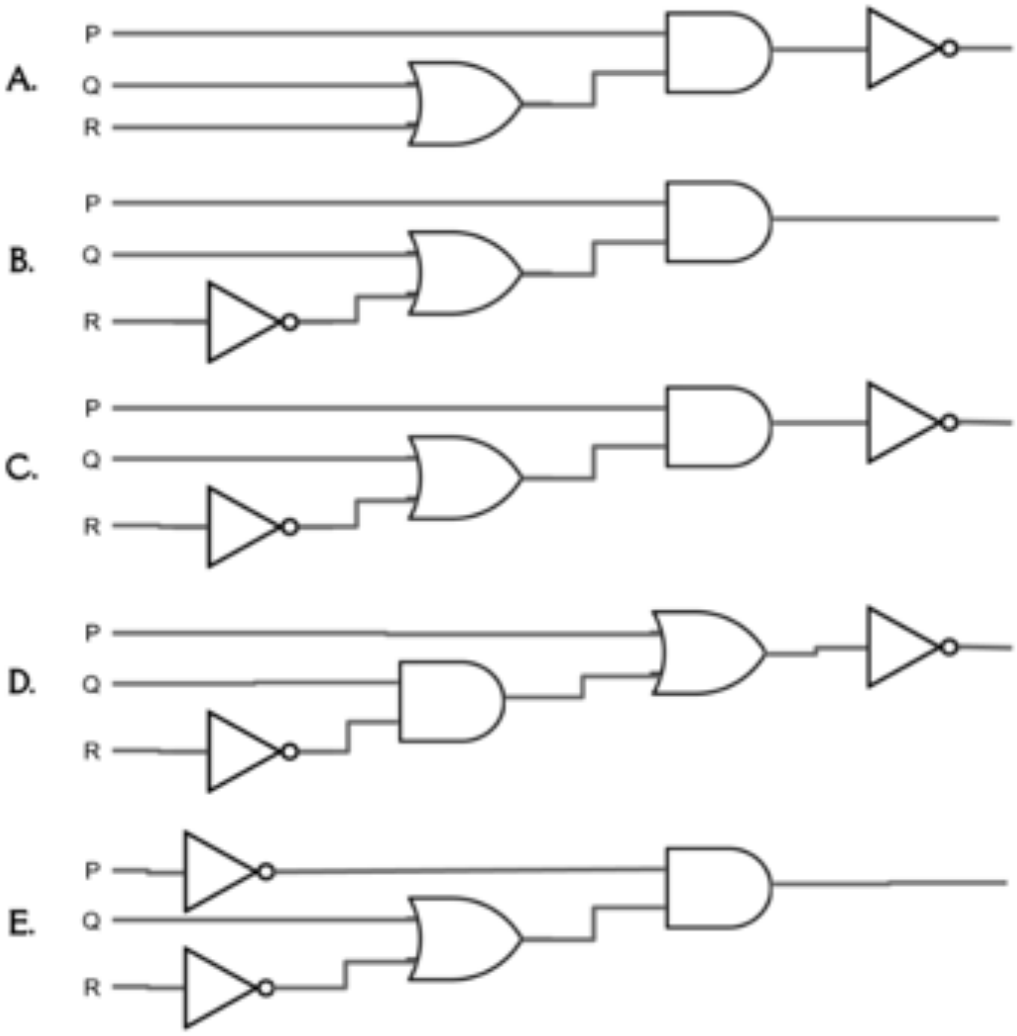
```
P or (Q and R)
```

and

```
(P or Q) and R
```

the same? Construct truth tables for each to test.

2. Which circuit below implements `NOT (P and (Q or NOT R))`



3. If a valid email address has four parts:
   - recipient name
   - @ symbol
   - domain name
   - top-level domain

   where recipient name may be a maximum of 64 characters long and consist of:

   - uppercase and lowercase letters in English (A-Z, a-z),
   - digits from 0 to 9, and
   - the special characters **+ - _ .** (plus, underscore, hyphen, period)

   and the special characters cannot appear as the first or last character in an email address or appear consecutively two or more times.

   The domain name part of an email address is a list one or more dot-separated names of 63 characters or less and consisting of:

   - uppercase and lowercase letters A to Z and a to z;
   - digits 0 to 9, provided that top-level domain names are not all-numeric.

   A "top-level domain" is the highest level of the domain name system and is placed after the domain name in an email address.

   For our purposes, suppose the top level domains are limited to:

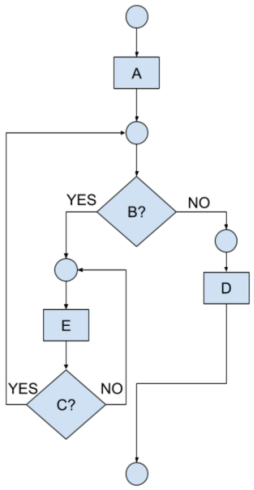
   .com, .net, .org, .ca, .us, .edu, .cn, .kr, .ng, .pk, .in

   Create a regular expression that will detect valid email addresses and test it against the examples below.

Success/Match	Fail/No Match

`abc@def.org`
`abc.def@ghi.jkl.mno.com`
`a5_23@bcd.efg.edu`
`abc+def@`
	`abc.@def.org`
	`abc def@ghi.jkl.mno.com`
	`_23@bcd.efg.edu`
	`abc+def@ghi.jkl`

4. Select the pseudocode that best matches this flowchart




```
A
while B
 repeat E until C
D
```

```
A
while B
 repeat E until not C
D
```

```
A
repeat
   while B
     do E
   until not C
D
```

```
A
if B then
  E
  if C then
    repeat
else D
```

```
A
repeat
 while not C
    E
until B
D
```

5. Convert this binary message into text assuming it's ASCII encoded

```
01001001 01001001 01010100 01011001 01010111 01001001
01001101 01010111 01011001 01000010 01001101 01000001
01000100
```

6. Convert this hexadecimal message into text assuming it's ASCII encoded

```
49 66 20 49 20 74 65 6c 6c 20 79 6f 75 20 77 68 61 74
20 69 74 20 6d 65 61 6e 73 20 77 69 6c 6c 20 79 6f 75
20 62 75 79 20 6d 65 20 61 20 64 72 69 6e 6b 3f 0d 0a
```

7. The 7-segment display can, in addition to the digits 0-9, represent hexadecimal digits a through f

When we include these output patterns, segment A (top center) is illuminated for

0 2 3 5 6 7 8 9 a(10) e(14) f(15)

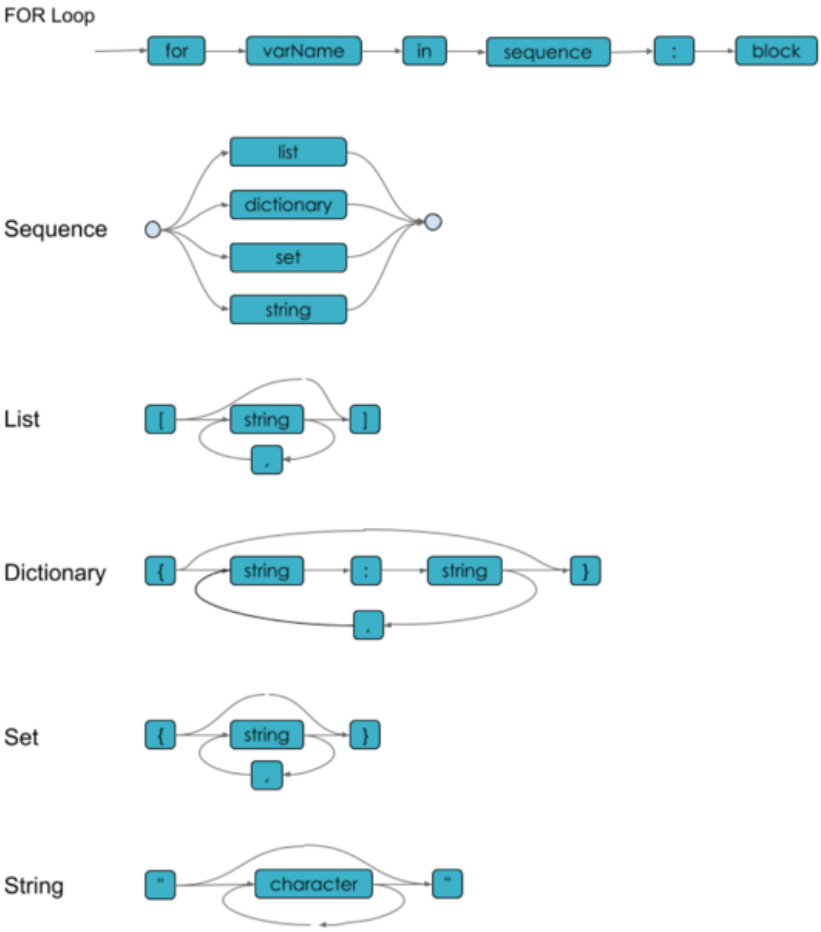
and so the expression for segment A is

```
A = ~w~x~y~z + ~w~xy~z + ~w~xyz + ~wx~yz +
    ~wxy~z + ~wxyz + w~x~y~z + w~x~yz + w~xy~z
    + wxy~z + wxyz
```

Which of the following represents the simplest reduction of this expression?

- `Y~Z + ~WY + W~X~Y + XY + ~X~Y~Z + ~WX~YZ`
- `~W~X~Z + ~W~XYZ + ~WX~YZ + ~WXY~Z + ~WXYZ + W~X~Y + WY~Z + WXYZ`
- `~W~X~Y~Z + ~W~XY + ~WX + ~WXYZ + W~X~Y~Z + W~X + WXY`
- `Y~Z + ~WY + W~X~Y + XY + ~X~Y~Z`
- `Y~Z + ~WY + W~X~Y + XY + ~X~Y~Z + W~XY~Z`

8. Suppose the diagrams below represent the syntax for a FOR loop in a programming language



Which of the following are valid according to the syntax above?

- `for x in ["apple", "banana", "carambola"] : block`
- `for x in ["apple", "fruit" : "banana", "carambola"] : block`
- `for x in {"apple" : "ripe", "banana" : "green", "carambola" : "rotten"} : block`
- `for x in [apple, banana, carambola] : block`
- `for x in ["apple", "banana", "carambola"] : block`

9. Consider the JSON (https://jsoneditoronline.org/?id=e9ff1c3caf634affa26e5e7e3f17664c) version of a tweet shown below. **Assuming the structure as a whole is called X, what dot notation expression will provide access to "PostGradProblems" around line 16?**

```
{
        "text": "RT @PostGradProblem: In preparation for the NFL lockout, I will be
    spending twice as much time analyzing my fantasy baseball team during ...",
```

```
      "truncated": true,
      "in_reply_to_user_id": null,
      "in_reply_to_status_id": null,
      "favorited": false,
      "source": "<a href=\"http://twitter.com/\" rel=\"nofollow\">Twitter for
iPhone</a>",
      "in_reply_to_screen_name": null,
      "in_reply_to_status_id_str": null,
      "id_str": "54691802283900928",
      "entities": {
            "user_mentions": [
                  {
                        "indices": [
                              3,
                              19
                        ],
                        "screen_name": "PostGradProblem",
                        "id_str": "271572434",
                        "name": "PostGradProblems",
                        "id": 271572434
                  }
            ],
            "urls": [ ],
            "hashtags": [ ]
      },
      "contributors": null,
      "retweeted": false,
      "in_reply_to_user_id_str": null,
      "place": null,
      "retweet_count": 4,
      "created_at": "Sun Apr 03 23:48:36 +0000 2011",
      "retweeted_status": {
            "text": "In preparation for the NFL lockout, I will be spending twice as
much time analyzing my fantasy baseball team during company time. #PGP",
            "truncated": false,
            "in_reply_to_user_id": null,
            "in_reply_to_status_id": null,
            "favorited": false,
            "source": "<a href=\"http://www.hootsuite.com\"
rel=\"nofollow\">HootSuite</a>",
            "in_reply_to_screen_name": null,
            "in_reply_to_status_id_str": null,
            "id_str": "54640519019642881",
```

```
            "entities": {
                  "user_mentions": [ ],
                  "urls": [ ],
                  "hashtags": [
                        {
                              "text": "PGP",
                              "indices": [
                                    130,
                                    134
                              ]
                        }
                  ]
            },
            "contributors": null,
            "retweeted": false,
            "in_reply_to_user_id_str": null,
            "place": null,
            "retweet_count": 4,
            "created_at": "Sun Apr 03 20:24:49 +0000 2011",
            "user": {
                  "notifications": null,
                  "profile_use_background_image": true,
                  "statuses_count": 31,
                  "profile_background_color": "C0DEED",
                  "followers_count": 3066,
                  "profile_image_url":
"http://a2.twimg.com/profile_images/1285770264/PGP_normal.jpg",
                  "listed_count": 6,
                  "profile_background_image_url":
"http://a3.twimg.com/a/1301071706/images/themes/theme1/bg.png",
                  "description": "",
                  "screen_name": "PostGradProblem",
                  "default_profile": true,
                  "verified": false,
                  "time_zone": null,
                  "profile_text_color": "333333",
                  "is_translator": false,
                  "profile_sidebar_fill_color": "DDEEF6",
                  "location": "",
                  "id_str": "271572434",
                  "default_profile_image": false,
                  "profile_background_tile": false,
                  "lang": "en",
```

```
                "friends_count": 21,
                "protected": false,
                "favourites_count": 0,
                "created_at": "Thu Mar 24 19:45:44 +0000 2011",
                "profile_link_color": "0084B4",
                "name": "PostGradProblems",
                "show_all_inline_media": false,
                "follow_request_sent": null,
                "geo_enabled": false,
                "profile_sidebar_border_color": "C0DEED",
                "url": null,
                "id": 271572434,
                "contributors_enabled": false,
                "following": null,
                "utc_offset": null
            },
            "id": 54640519019642880,
            "coordinates": null,
            "geo": null
      },
      "user": {
            "notifications": null,
            "profile_use_background_image": true,
            "statuses_count": 351,
            "profile_background_color": "C0DEED",
            "followers_count": 48,
            "profile_image_url":
"http://a1.twimg.com/profile_images/455128973/gCsVUnofNqqyd6tdOGevROvko1_500_normal.
jpg",
            "listed_count": 0,
            "profile_background_image_url":
"http://a3.twimg.com/a/1300479984/images/themes/theme1/bg.png",
            "description": "watcha doin in my waters?",
            "screen_name": "OldGREG85",
            "default_profile": true,
            "verified": false,
            "time_zone": "Hawaii",
            "profile_text_color": "333333",
            "is_translator": false,
            "profile_sidebar_fill_color": "DDEEF6",
            "location": "Texas",
            "id_str": "80177619",
            "default_profile_image": false,
```

```
            "profile_background_tile": false,
            "lang": "en",
            "friends_count": 81,
            "protected": false,
            "favourites_count": 0,
            "created_at": "Tue Oct 06 01:13:17 +0000 2009",
            "profile_link_color": "0084B4",
            "name": "GG",
            "show_all_inline_media": false,
            "follow_request_sent": null,
            "geo_enabled": false,
            "profile_sidebar_border_color": "C0DEED",
            "url": null,
            "id": 80177619,
            "contributors_enabled": false,
            "following": null,
            "utc_offset": -36000
        },
        "id": 54691802283900930,
        "coordinates": null,
        "geo": null
}
```


10. To use the New York Times Movies API you will need to add it to your app on this page: https://developer.nytimes.com/my-apps. Click the toggle button on the lower right of the MoviesAPI icon and then click SAVE on the upper right of the page.

    Then go to the Movies API page and on the left under /reviews/… select search.json. Be sure to authorize using your APP API-KEY and then find out

    What is the URL for the first review of the original Lion King movie?

11. Suppose a group consists of the following people:

    Ali, age 9, height 1.5m

    Beth, age 9, height 1.6m

    Cara, age 14, height 1.4 m

    Dov, age 14, height 2m

    Ehud, age 12, height 1.8m

    Farad, age 11, height 1.9m

    Goli, age 15, height 1.7m

    Hithi, age 9, height 1.3m

    The group stands in line according to height with the shortest in the front of the line.

One by one they are popped onto a stack until they are all on the stack.

Then they are popped off the stack and added to a priority queue where younger folks have priority (you move up if the person in front is older).

In what order are they at the end of this process?

12. Consider this trip which you might need to make next week

    Day 1 Flight 11:35 YYZ – SFO Flight AC234

    Arrive SFO 7:45pm

    Taxi to hotel The Regis Reservation number 984392

    Day 2

    Meeting with Mark Zuckerberg 10:00am – 11:00 am Location : Facebook HQ

    Meeting with Ramzi O'Donnel 2:00pm-3pm Location 324 Market Street Room 329

    Meeting (over dinner) with Donal McQatro Location 29 Backlit Ave 7:00pm-9pm

    Ending Location: San Francisco

    Day 3

    Meeting (over breakfast) with Georgia Muhl 7:00 am -8:00 am Location The Regis

    Flight: 11:00am SFO-YYZ AC325 Arrive YYZ: 1:30pm

    Create a JSON structure to store data like this for an itinerary