

COMP 2406 A Fall 2014 midterm test

READ THESE INSTRUCTIONS CAREFULLY

This test will be graded automatically using the answers you put on the **SCANTRON** answer card provided with the test.

- Use an **HB (#2)** lead pencil. Other pencils or pens do not scan properly.
- Completely erase any changed answers with a **soft eraser**.
- Mark your answer **firmly** and **neatly**. Blank or un-scannable answers will be counted as wrong.
- Make sure to fill in the bubbles in the **identification section**; Scantron cannot read what you write.

The "*Scantron General Purpose Answer Sheet*", has a number of information fields described below. Write a letter or number at the top of the column and fill in the corresponding bubble below with your HB pencil. If there are more columns than you need, start at the left and leave columns to the right blank.

1. *FIRST NAME* and *LAST NAME*: fill in the boxes and bubbles accordingly.
2. *S* : PUT your **course section letter** (not your middle initial) in the box and bubbles.
3. *COURSE NO*: Put **course number** in this field. e.g. **COMP2402**.
4. *DATE OF EXAM*: fill in the **date of the exam** (not your birth date) in the box and bubbles.
5. *STUDENT NUMBER* : put your **student number** in the box and bubbles starting at the left. Do not fill in extra spaces with zeros.
6. *SEX*: not required -leave this **blank**
7. *EXAM VERSION NO*: not required -leave this **blank**.

IMPORTANT: Fill in the *STUDENT NUMBER* box properly, it's used to identify you automatically.

This test consists of **25** questions that each have five possible answers labeled A,B,C,D or E. Each question has only ONE intended right answer.

If you change your mind about an answer then erase the old one carefully so smudges don't confuse the scanner and affect your grade. Be careful not to skip answer spaces or questions because your answers will then all be "off by one". All the questions are worth equal weight. Good Luck!

INTERNET PROGRAMMING GENERAL

- 1) Which ONE of the following is FALSE about URL's, IP addresses and Ports?
- A) Accessing `http://localhost:3000` uses the TCP/IP stack
 - B) An IP address can serve more than one port number at a time.
 - C) Substituting the DNS lookup IP address for a URL domain in a GET request will always direct you to the same web page.
 - D) An IP address represents a computer host on the internet.
 - E) A port number need not always be supplied in a URL.
- 2) Which ONE of the following statements about the HTTP protocol is TRUE?
- A) HTTP cannot transport content other than HTML.
 - B) HTTP has only two verbs: GET and POST.
 - C) HTTP must be used on PORT 80.
 - D) HTTP is stateless (has no notion of previous messages)
 - E) Both HTTP GET and POST results can be cached by the browser.
- 3) Which ONE of the following is TRUE regarding the difference between a GET and POST HTTP request?
- A) GET can communicate user query parameters and values but POST cannot.
 - B) POST requests are encrypted but GET requests are not.
 - C) POST parameters are visible in the browser address bar but GET parameters are not.
 - D) GET HTTP requests can be inspected by routers but POST requests cannot.
 - E) GET query parameters are limited in length by POST parameters are not.
- 4) HTTPS is based on public key cryptography. Public key cryptography is considered secure because of which one of the following facts?
- A) It is hard to find a prime number of a given size (in bits).
 - B) Multiplying two large primes is computationally difficult.
 - C) Factoring large primes is computationally difficult.
 - D) Modular exponentiation (raising a large prime to an integer exponent) is computationally difficult.
 - E) Modular root extraction (the reverse of modular exponentiation) is computationally difficult.
- 5) Which ONE of the following is TRUE about the SSL (secure socket layer) handshake used in HTTPS.
- A) SSL is at the application layer in the TCP/IP stack and a peer application of HTTP.
 - B) HTTPS requires that sender and receiver exchange private keys prior to the communication.
 - C) HTTPS will use a public encryption key throughout the communication between client and server.
 - D) HTTPS will use public key encryption to exchange private keys used for further communication between client and server
 - E) In HTTPS the client uses a public key but the server uses a private key.

JAVASCRIPT

6) Which ONE of the following best describes the difference between javascript's == and === operator?

- A) The == is used to compare primitives but the === is used to compare objects.
- B) == will return true or false only but === can return true, false, or null.
- C) === is only used for comparisons on strings.
- D) == will answer whether two string variables are identical (refer to the same string object) but === will answer whether their characters match.
- E) == allows the compiler to type-cast its arguments but === does not allow type casting.

7) Which ONE of the following is not a primitive in Javascript?

- A) boolean
- B) undefined
- C) string
- D) number
- E) array

8) Which ONE of the following statements is NOT legal in Javascript?

- A) var method;
- B) object = {case: value};
- C) object = {'case': value};
- D) object.box = value;
- E) object['case'] = value;

9) Consider the following Javascript code:

```
function f(){
  for(var i=0; i<5; i++) //line 1
    console.log("i: " + i);
}
f();
console.log("i: " + i); //line 2
```

Which ONE statement below best describes the result of removing the keyword var in line 1 above (that is, changing var i=0; to just i=0;)?

- A) Line 1 would not compile.
- B) Line 2 would no longer compile where previously it did.
- C) Line 2 would print 0
- D) Line 2 would print 5
- E) Line 2 would throw a runtime error.

10) When the following piece of javascript is run with Node.js it produces the output shown:

```
a = 0.2;
b = 0.1;
console.log("a: " + a);
console.log("b: " + b);
console.log("a+b: " + (a+b));
```

OUTPUT:

```
a: 0.2
b: 0.1
a+b: 0.30000000000000004
```

Which ONE of the following is correct about why the output for a+b is not just 0.3?

- A) Because a and b are declared without var keyword.
- B) Because the floating point representation in javascript cannot represent the fraction 1/10 exactly.
- C) Because the last line concatenates a and b rather than adding them as numbers.
- D) Because variables a and b are not declared to be of type float.
- E) Because of a known error in the Node.js javascript interpreter.

11) Which ONE of the following best describes what happens if you access a non-existing member of an object in Javascript?

- A) The code does not compile.
- B) The code throws a run-time exception.
- C) The access returns null.
- D) The access returns undefined.
- E) The member added to the object with default value null.

12) Consider the following javascript code:

```
var a = [];
a[0] = 12;
a[5] = "Lou";
a["Sue"] = "Smith";
console.log("a: ", a);
console.log("length: ", a.length);
```

Which ONE of the following is true about the code above?

- A) The code will not compile because `var a = [];` is not legal.
- B) The code will not compile because `a["Sue"] = "Smith";` is not legal.
- C) The code compiles and runs and the last line outputs: length: 3
- D) The code compiles and runs and the last line outputs: length: 5
- E) The code compiles and runs and the last line outputs: length: 6

13) Which ONE of the following best explains why javascript function objects have two prototypes?

- A) One is used for function definition the other for function invocation.
- B) It allows function objects to use multiple inheritance.
- C) **One is used for object inheritance and one is used for constructor inheritance.**
- D) One is used for ancestors (superclasses) and one for children (subclasses).
- E) All objects, not just function objects, have two prototypes.

14) Which of the following best describes the implication of closures in javascript

- A) Closures make use of the traditional procedure stack without requiring modification of the stack.
- B) **Closures use heap memory to store closure scope variables instead of the stack.**
- C) Closures are a lexical (compile-time) features and don't require memory at run-time.
- D) Closures mean that variables defined outside a function are not visible to that function.
- E) Closures allow two separate functions to see each other's local variables.

15) Consider the following javascript code:

```
function make(){  
  
    var local = 1000;  
  
    aFunc1= function(x){  
        return x + local;  
    }  
  
    aFunc2= function(x){  
        local =x;  
        return local;  
    }  
  
    //return the two functions in a compound object  
    return { "f1" : aFunc1, "f2" : aFunc2};  
}  
  
var f = make();  
  
console.log(f.f2(99990)); //LINE 1  
console.log(f.f1(1)); //LINE 2
```

Which ONE of the following is TRUE about the code above?

- A) LINE 1 will not run because var local is not visible (in scope).
- B) LINE 2 will not run because it tries to modify the value of var local.
- C) LINE 2 will output undefined;
- D) LINE 2 will output 1001;
- E) **LINE 2 will output 99991;**

16) Consider the following javascript code:

```
var counter = 100;    //line 1

function make(){
    return function(x){return x + counter;} //line 2
}

var action = make(); //line 3
console.log(action(8)); //line 4
```

Which ONE of the following statements about the above code is TRUE?

- A) line 2 will not compile because the function being returned has no name.
- B) line 3 is not legal because a function cannot be returned as an object.
- C) line 4 is not legal because the object returned by make cannot be invoked as a function.
- D) line 4 is legal and will print 8 to the console
- E) line 4 is legal and will print 108 to the console.

NODE JS and EXPRESS

17) Consider the following code that implements a Node.js server.

```
var http = require('http'); //need to http
var fs = require('fs'); //need to read static files
var url = require('url');
var counter = 1000; //to count invocations of function(req,res)
var ROOT_DIR = 'html'; //dir for static files

http.createServer(function (request,response){
    var urlObj = url.parse(request.url, true, false);
    console.log("PATHNAME: " + urlObj.pathname);
    console.log("REQUEST: " + ROOT_DIR + urlObj.pathname);

    fs.readFile(ROOT_DIR + urlObj.pathname, function(err,data){
        if(err){
            console.log('ERROR: ' + JSON.stringify(err));
            response.writeHead(404);
            response.end(JSON.stringify(err));
            return;
        }
        response.writeHead(200, {'Content-Type': 'text/html'});
        response.end(data);
    });
}).listen(3000);
```

Which ONE of the following statements about this code is TRUE?

- A) The application serves dynamic web pages, not static files.
- B) The file reading is synchronous.
- C) function(request, response) is invoked when createServer(...) is called in the code.
- D) images cannot be served by this server.
- E) css style sheets cannot be served by this server.

18) Consider the following code intended to be executed in by Node.js:

```
var http = require('http'); //need to http

var options = {hostname: 'localhost', port: '3000', path: '/',
               method: 'POST'
}
function readJSONResponse(response){
  var responseData = '';
  response.on('data', function(chunk){responseData += chunk});
  response.on('end', function(){
    var dataObj = JSON.parse(responseData);
    console.log('Message: ' + dataObj.message);
    console.log('Question: ' + dataObj.question);
  });
}

var req = http.request(options, readJSONResponse);
req.write('{"name" : "Bilbo", "occupation": "Burgler"}');
req.end();
```

Which ONE of the following is true about this code?

- A) The code implements a server that will use HTTP to communicate with a server.
- B) The code implements a client that will use HTTPS to POST information to a server.
- C) The code implements a server based on Node.js only and not Express.
- D) **The code implements a non-browser client that will make a single request to a server.**
- E) The code implements a browser-based client that will POST HTTP messages to a server.

19) Which ONE of the following statements about package.json files is TRUE?

- A) They are dangerous because they can easily refer to the wrong version of an NPM module.
- B) They are always needed to run a node.js application.
- C) They are only applicable to Express applications, not plain Node.js apps directly.
- D) **They provide a way to load a specific versions of an NPM module.**
- E) They are the mechanism used to help ensure the latest version of an NPM module is loaded.

20) Which aspect of the Model View Controller pattern does Express NOT implement?

- A) **Model**
- B) View
- C) Controller
- D) Binding Views and Controllers
- E) Invoking Controllers

21) Which of the following is the most direct implementation of the Gamma Memento Pattern?

- A) Cookies
- B) Sessions
- C) Public/Private Keys
- D) Page Redirect (using 303, or 302 http response code)
- E) Routing in Express

22) Which of the following best describes the essential difference between `app.get(...)` and `app.use(...)` in Express?

- A) `get(...)` is used for HTTP GET requests only, `use(...)` handles both GET and POST requests
- B) `get(...)` function calls must appear before the `use(...)` calls in the `app.js` file
- C) `get(...)` has access to the request and response objects, but `use(...)` only has access to the response objects.
- D) `get(...)` has access to the URL path of the request but `use(...)` does not.
- E) `use(...)` can cause a page redirect, but `get(...)` cannot.

23) Consider the following code intended to implement a Node.js based static server which could serve static files similar to those found on our course web site.

```
var http = require('http');
var fs = require('fs');
var url = require('url');
var counter = 1000; //to count invocations of function(req,res)
var ROOT_DIR = 'public'; //dir for static files

http.createServer(function (request, response){

    var urlObj = url.parse(request.url, true, false);

    fs.readFile(ROOT_DIR + urlObj.pathname, function(err,data){
        if(err){
            console.log('ERROR: ' + JSON.stringify(err));
            response.writeHead(404);
            response.end(JSON.stringify(err));
            return;
        }
        response.writeHead(200, {'Content-Type': 'text/html'});
        response.end(data);
    });
}).listen(3000);
```

Which of the following best explains why it would not work as intended?

- A) It should `require('express')` not `require('http')`;
- B) The `.readFile()` function is synchronous but should be asynchronous.
- C) The content type `'text/html'` is used for all content.
- D) It is missing the `use(express.static)` middleware required to be a static server.
- E) The response code of 200 is incorrect and should be a 303 code.

24) Consider the following code intended to implement an Express Version 4.x based static server which could serve static files similar to those found on our course web site.

```
var express = require('express'); //express framework
var logger = require('morgan'); //request logger
var app = express();

var root_dir = '/html'; //root directory for static pages

app.all('*', function(req, res, next){
  console.log('-----');
  console.log('req.path: ', req.path);
  console.log('serving:' + __dirname + root_dir + req.path);
});

//use morgan logger to keep request log files
app.use( logger('dev') );

//use static middleware to implement static server
app.use(express.static(__dirname + root_dir));

app.listen(3000);
```

Which of the following best explains why it would not work as intended?

- A) It should require('http') not require('express');
- B) The app.all() route should appear after the .use() calls in the file
- C) The .all logging conflicts with the logging provided by morgan.
- D) **The .all route is not allowing the next middleware to run.**
- E) The root_dir should be '/public' not '/html'.

25) Which of the following best describes relationship between a .jade file and a .html file?

- A) A .html file contains html markup and a .jade file contains javascript.
- B) A .jade file javascript in <script> tags intended to be imbedded in a .html file.
- C) A .html file is for static pages but a .jade file is for pages that contains javascript generated content.
- D) **A .jade file is an abstraction of a .html file that uses a simpler representation of html tags.**
- E) A .jade file contains a view engine used to render .html files.