National University of Singapore

School of Computing

MID-SEMESTER TEST FOR Semester 2 AY2016/2017

CS1010E — Programming Methodology

07 March 2017 Time Allowed: 60 Minutes

INSTRUCTIONS TO CANDIDATES

1. This test paper contains TWENTY (20) questions and comprises TEN (10) printed pages, including this page.

2. Every question is worth one mark.
   The maximum possible mark in total is 20.

3. Answer ALL questions by shading the letter corresponding to the *most appropriate* answer on the OCR form provided.

4. This is an OPEN BOOK test.

5. Do not look at the questions until you are told to do so.

6. There is no negative marking, so please attempt every question.

7. You may keep the question paper after the test is over.

For all the questions, assume that the relevant `#include` pre-processor statements have already been included in the program where necessary. Choose the most appropriate answer for each question.

1. What is printed out by the following C code fragment?

```
int x;
x = 4 + 6 / 3 * 2 - 2;
printf("%d", x);
```

A. `4`

B. `3`

C. `6` ⟸

D. `A compilation error occurs.`

E. `A run-time error occurs.`

2. What is printed out by the following C program fragment?

```
int i = 0, j = 0;
printf("%d", i != j ? i = j : i == j);
```

A. `0`

B. `1` ⟸

C. `A non-zero value.`

D. `A compilation error occurs.`

E. `None of the above.`

3. Assume the int variable `num` is assigned a number between 1 and 1000 inclusive. Which of the following statement(s) evaluate to *true* (ie. a nonzero value) when `num` is an odd number?

A. `num % 2 ? 0 : 1`

B. `(num - 1) % 2`

C. `(num + 1) % 2`

D. `num % 2` ⟸

E. `All of the above evaluate to false.`

4. What is printed out by the following C program fragment?

```
int a = -1, b = 999/1000, x = 1;
if (a / b > 5 || a) --x;
else  x++;
printf("%d", x);
```

A. 0

B. 1

C. 2

D. A compilation error will occur.

E. A division-by-zero error will occur. ⟸

5. What is printed out by the following C code fragment?

```
int x = 4, y = 0;
if (x > 4) ;
    y++;
else y++;
printf("%d", y);
```

A. 0

B. 1

C. 2

D. 4

E. None of the above. ⟸

6. What is printed out by the following C code fragment?

```
int a = 0, b = 1, c = 0, d = 0;
if (a++ || ++b)
    if (b++ && c++) d++; else d += 2;
else
    d += 4;
printf("%d %d %d %d", a, b, c, d);
```

A. `0 3 0 4`

B. `1 2 0 4`

C. `1 2 0 0`

D. `1 3 1 1`

E. `1 3 1 2` ⟸

7. What is printed out by the following C code fragment?

```
int i = 100, x = 0;
while (--i > 0) ++x;
printf("%d %d", i, x);
```

A. `0 99` ⟸

B. `0 100`

C. `1 99`

D. `1 100`

E. `None of the above.`

8. What is printed out by the following C code fragment?

```
int i = 10;
do --i; while (i--);
printf("%d", i);
```

A. `-2`

B. `-1`

C. `0`

D. `1`

E. `None of the above.` ⟸

9. What is printed out by the following C code fragment?

```
int i;
for (i = 0; i < 50; i += 2) i += 2;
printf("%d", i);
```

A. 48

B. 50

C. 52 ⟸

D. 56

E. None of the above

10. What is printed out by the following C code fragment?

```
int i = 0, j = 0;
while (i < 999) {
    switch (j) {
        case 0: j += i; break;
        case 1: j += i; continue;
        case 2: j += i; break;
        default: i = 1000;
    }
    i++;
}
printf("%d", j);
```

A. 1

B. 2

C. 3 ⟸

D. 4

E. None of the above

11. What is printed out by the following C code fragment?

```
int i, j, k = 0;
for (i = 10; i > 0; i /= 2) {
    for (j = 0; j < i; j++)
        k++;
}
printf("%d\n", k);
```

A. `0`

B. `8`

C. `18` ⟸

D. `An infinite loop occurs.`

E. `None of the above.`

12. What is printed out by the following C code fragment?

```
int i, j, k = 0;
for (i = 1; i <= 100; i *= 2)
    for (j = i; j <= i; j++)
        k++;
printf("%d", k);
```

A. `7` ⟸

B. `100`

C. `12`

D. `128`

E. `None of the above.`

13. What number the *most likely to be closest* to the number that is printed out by the following C code fragment?

```
int i, count = 0;
for (i = 0; i < 1000; i++)
    if (rand() % 3) continue;
    else if (++count > 984) break;
printf("%d", count);
```

A. `985`

B. `665`

C. `335` ⟸

D. `100`

E. `None of the above.`

14. The `my_rand_float` function is defined below. Assume that `MY_RAND_MAX` has been defined to be some large positive number, but smaller than the largest integer stored in an `int` variable. Also assume that the function `my_rand` returns some integer between 0 and `MY_RAND_MAX` inclusive. Which of the following expressions generates a *random odd* integer in the range [7, 21], inclusive?

```
double my_rand_float()
{
    return ((double) my_rand() / (MY_RAND_MAX + 1);
}
```

A. `(int) (my_rand_float() * (21 - 7)) + 7`

B. `(int) (my_rand_float() * (11 - 3)) * 2 + 7` ⟸

C. `(int) my_rand_float() * (10 - 3) * 2 + 7`

D. `(int) (my_rand_float() * 2) * (10 - 2) + 7`

E. `None of the above.`

15. What is printed by the following C code fragment?

```
#define max(a,b,c) ((a) >= (b) ? (a + c) : (b + c))

int main() {
int x = 5, y = 6, z = 7;
    z = max(x, y, ++z);
    printf("%d", z);
}
```

A. `11`

B. `12`

C. `13`

D. `14` ⟸

E. `None of the above.`

16. What is printed by the following C code fragment?

```
int increase(int);
int i = 0;

int main()
{
    extern int i;
    increase(i);
    printf("%d", increase(increase(i)));
}

int increase(int i)
{
    return i += 2;
}
```

A. 0

B. 2

C. 4 ⟸

D. 6

E. None of the above.

17. What is printed by the following C code fragment?

```
int increase(int);
int i = 0;

int main()
{
    extern int i;
    increase(i);
    printf("%d", increase(increase(i)));
}

int increase(int i)
{
    static int j;
    j = i;
    return j += 2;
}
```

A. 0

B. 2

C. 4 ⟸

D. 6

E. None of the above.

18. What is printed by the following C code fragment?

```
int f(int), g(int);

int main() {
    int i = 0, count = 0;
    while (i < 999) {
        if (i % 2) i = f(g(i)); else i = g(f(i));
        count++;
    }
    printf("%d", count);
}

int f(int n) {
    return n % 2 ? n + 2 : n;
}
int g(int n) {
    return !(n % 2) ? n + 2 : n;
}
```

A. 999

B. 500 ⟸

C. 250

D. 100

E. None of the above.

19. What is printed by the following C code fragment?

```
int f(int x);

int main() { printf("%d", f(4)); }

int f(int x) {
   if (x < 0) return 0;
   if (x % 2) return 1 + f(x - 1);
   return 2 + f(x - 1);
}
```

A. 6

B. 7

C. 8 ⟸

D. 9

E. None of the above.

20. What is printed by the following C code fragment?

```
int f(int), m(int);

int main() { printf("%d", f(2)); }

int f(int k) {
    return k ? k - m(f(k - 1)) : 0;
}
int m(int k) {
    return k ? k - f(m(k - 1)) : 1;
}
```

A. 1 ⟸

B. 2

C. 3

D. 0

E. None of the above.

END of PAPER