National University of Singapore

School of Computing

MID-SEMESTER TEST FOR Semester 2 AY2015/2016

CS1010E — Programming Methodology

12 March 2016 Time Allowed: 60 Minutes

INSTRUCTIONS TO CANDIDATES

1. This test paper contains TWENTY (20) questions and comprises NINE (9) 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. Which of the following, if any, is *not* a valid identifier?

   A. `AmIValid`

   B. `AmIValid123`

   C. `_AmIValid_`

   D. `_AmIValid?` ⟸

   E. *All of the above are valid identifiers.*

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

```
char a = 52;
unsigned short int b = 99;
float e;
b = a + b;
e = (float) (b / a + b);
printf("%f\n", e);
```

   A. `151.000000`

   B. `152.000000`

   C. `153.000000` ⟸

   D. `A runtime error occurs`

   E. `None of the above`

3. What is printed by the following C program fragment?

```
int a = 11252;
unsigned short int b = 65535, c; /* 65535 equals 2^(16) - 1 */
float e;
c = a + b;
e = (float) (c / b);
printf("%f\n", e);
```

   A. `0.000000` ⟸

   B. `1.171695 (equals ((65535 + 11252) / 65535))`

   C. `0.171679 (equals (11251 / 65535))`

   D. `A runtime error occurs`

   E. `None of the above`

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

```
int x = 5, y = 112;
if (x < y)
if (y > 7) y++;
else x++; y++;
y += 2;
x += 2;
printf("%d %d\n", x, y);
```

A. `6 118`

B. `7 118`

C. `7 116` ⟸

D. `A compilation error occurs`

E. `None of the above`

5. What is printed by the following C program fragment?

```
int x = 5, y = 112;
if (x < y)
if (y > 7) y++;
else x++; y++;
else
y += 2;
x += 2;
printf("%d %d\n", x, y);
```

A. `6 118`

B. `7 118`

C. `7 116`

D. `A compilation error occurs` ⟸

E. `None of the above`

6. What is printed by the following C program fragment?

```
int x = -2, y = 2;
printf("%d ", ++x - --y);
printf("%d ", x++ - y--);
printf("%d\n", x + y);
```

A. `-2 -2 0` ⟸

B. `-2 -1 0`

C. `-1 -1 0`

D. `-2 -1 1`

E. `None of the above`

7. For what values of `a`, `b`, `c` will a value of $6000 \leq$ `x` ≤ 12000 be finally obtained?

```
int a, b, c, x = 0;
if (a) x += 3843;
if (b) x += 1321;
if (c) x += 8313;
```

A. `1 1 0`

B. `1 1 1`

C. `0 1 0`

D. `1 0 1`

E. `None of the above` ⟸

8. What sequence of values of `a`, `b`, `c` will cause a *nonzero value* of `x` to be printed?

```
int t, a, b, c, x;
x = ((t = ((a < b) && --c) ? a : b) < c ) ? t : c - 1;
printf("%d\n", x);
```

A. `0 0 1`

B. `0 1 2`

C. `1 1 1`

D. `2 1 0` ⟸

E. `None of the above`

9. What is printed by the following C program fragment?

```
int i = 66, j = 34;
switch (i / j) {
    case 0: j += 3; break;
    case 1: j /= 4 + 1;
    case 2: j *= 5; break;
    default: j -= 6;
} printf("%d\n", j);
```

A. `37`

B. `170`

C. `45`

D. `30` ⟸

E. `None of the above`

10. What is printed by the following C program fragment?

```
int i, j, n = 2000;
for (i = 1, j = 1; i <= n; i++) {
    if (j > 1000) break;
    if (i % 2) j++;
}
printf("%d\n", j);
```

A. 1000

B. 1001 ⟸

C. 2000

D. 2001

E. None of the above

11. What is printed by the following C program fragment?

```
int i, j, count = 0;
for (i = 1; i <= 4; i++)
    for (j = 1; j <= 12; j++) {
        if (j > i) break;
        count++;
    }
printf("%d\n", count);
```

A. 10 ⟸

B. 11

C. 12

D. 15

E. None of the above

12. What is printed by the following C program fragment?

```
int i, j, count = 0;
for (i = 1; i <= 4; i++)
    for (j = 1; j <= 12; j++) {
        if (j > i) continue;
        count++;
    }
printf("%d\n", count);
```

A. 10 ⟸

B. 11

C. 12

D. 15

E. None of the above

13. What is printed by the following C program fragment?

```
int j = 888, x, count = 0;
x = rand() + 1;
while (j -= 2) {
    if (((2 * x) + 1) % j) count++;
    x = rand() + 1;
}
printf("%d\n", count);
```

A. 443 ⟸

B. 444

C. 887

D. 888

E. None of the above

14. What is printed by the following C program fragment?

```
int i = 1, j, count = 0;
do {
    count += i;
    for (j = 1; j < i; j++) count--;
    i++;
} while (i < 987);
printf("%d\n", count);
```

A. 988

B. 987

C. 986 ⟸

D. 985

E. None of the above

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

```
int i, j, count = 0;
for (i = 1; i <= 5; i++)
    for (j = 5; j >= 1; j--)
        if (abs(i - j) == 1) count++;
printf("%d\n", count);
```

A. 25

B. 8 ⟸

C. 10

D. 5

E. None of the above

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

```
void min(int, int, int);

int main(void) {
    int i = 23, j = 61, k = 0;
    min(i, j, k);
    printf("%d\n", k);
}

void min(int x, int y, int m) {
    if (x < y) m = x; else m = y;
}
```

A. 0 ⟸

B. 23

C. 61

D. 38

E. None of the above

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

```
void min2(int, int);
int k = 0;

int main(void) {
    int i = 23, j = 61;
    min2(i, j);
    printf("%d\n", k);
}

void min2(int x, int y) {
    static int k;
    if (x < y) k = x; else k = y;
}
```

A. 0 ⟸

B. 23

C. 61

D. 38

E. None of the above

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

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

int main(void) {
    printf("%d\n", g(f(2)));
}

int f(int x) {
    return g(2*x);
}

int g(int x) {
    return 3*x;
}
```

A. 24

B. 12

C. 18

D. 36 ⟸

E. None of the above

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

```
int ff(int);
int gg(int);

int main(void) {
    printf("%d\n", ff(5));
}

int ff(int n) {
    if (n >= 0) return (2 + gg(n - 2));
    else return 0;
}

int gg(int n) {
    if (n >= 0) return (3 + ff(n - 2));
    else return 0;
}
```

A. 5

B. 6

C. 7 ⟸

D. 8

E. None of the above

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

```
void fff(int);

int main(void) {
    fff(6);
}

void fff(int n) {
  if (n < 0) return;
  fff(n - 2);
  if (n % 3 == 0) printf("%d ", n);
  fff(n - 3);
}
```

A. 6 3 0 0

B. 0 6 3 0 ⟸

C. 0 0 6 3

D. 0 3 6 0

E. None of the above

END of PAPER