

# Physics 234: Computational Physics

## Practice Midterm Exam Questions

1. We define and increment an 8-bit type. What is the final value of `a`?

```
unsigned char a = 255;
++a;
```

- (a) 256
- (b) 0
- (c) 1
- (d) compiler error

2. What is the final value of `z`?

```
void foo(int n, float x) { x = n*x; }
void bar(int n, float &x) { x = n*x; }
int main() {
    float z = 3.75;
    foo(4,z); bar(2.3,z);
    return 0; }
```

- (a) 7.5
- (b) 8.625
- (c) 15
- (d) 34.5

3. What is the value assigned to `u`?

```

double 2times(double x) { return 2.0*x }
double 3times(double x) { return 3.0*x }
int main()
{
    const double u = 3times(2times(1.0));
    return 0;
}

```

- (a) 2.0
- (b) 3.0
- (c) 6.0
- (d) compiler error

4. What are the values of x,y,z?

```

int MyFunc(int n) { return 2*n+-1; }
int mYFunc(int n) { return 2*(n+1)+1; }
int mYFunc(int n,int m) { return 2*(n+m)+1; }
int main()
{
    const int x = MyFunc(3);
    const int y = mYFunc(2);
    const int z = mYFunc(1,0);
    return 0;
}

```

- (a) 7,7,3
- (b) 5,7,3
- (c) 5,7,0
- (d) compiler error

5. What is the final value of prod?

```

int prod = 1;
for (int k = 0; k < 3; ++k)
    for (int l = 0; l < k; ++l)
        prod *= k;
        prod += l;

```

- (a) 4
- (b) 5
- (c) 6
- (d) compiler error

6. What is the output to the terminal?

```
#include <iostream>
using std::cout;
using std::endl;

bool is_ordered(int x, int y, int z)
{
    if (x < y < z) return true;
    return false;
}

int main()
{
    cout << is_ordered(2,1,3) << is_ordered(2,1,3)
         << is_ordered(1,2,0) << endl;
    return 0;
}
```

- (a) 010
- (b) 000
- (c) 110
- (d) compiler error

7. What is the value assigned to n?

```
const double x = 3.5;
const int n = ( x > 1.0 ? (x < 2.0 ? -1 : 0) : -2 );
```

- (a) -2
- (b) -1
- (c) 0

(d) compiler error

8. What is the final value of `c`?

```
void _upper(char &c)
{
    switch (c) {
        case 'a': c = 'A';
        case 'b': c = 'B';
        case 'c': c = 'C';
        case 'd': c = 'D'; }
}
int main() { char c = 'b'; _upper(c); return 0; }
```

(a) B

(b) C

(c) D

(d) compiler error

9. What are the final values of `x`, `y`?

```
double x = 5.0;
double y = -3.0;
if (x < 0.0)
    if (y < 0.0)
        x = -x;
else
    y = -y;
```

(a) 5.0, -3.0

(b) -5.0, -3.0

(c) -5.0, 3.0

(d) compiler error

10. What is the final values of `sum`?

```
double sum = 0.0;
for (int n = 1; n <= 10; ++n)
    sum += 1/n;
```

- (a) 0,0
- (b) 1.0
- (c) 2.92896825396825
- (d) compiler error

11. What are the final values of p,q?

```
double poly1(double x) { return 2*poly2(x)*x + 5; }  
double poly2(double x) { return 3*x + 4; }
```

```
int main()  
{  
    const double p = poly1(0.2);  
    const double q = poly2(1.0/3.0);  
    return 0;  
}
```

- (a) 6.84,5
- (b) 3.57,4
- (c) 2.13,3
- (d) compiler error

12. What is the value assigned to s?

```
const int s = sizeof("Hello?");
```

- (a) 5
- (b) 6
- (c) 7
- (d) 8

13. What is the final value of the C string?

```
char message[] = "This is a test";  
for (char* p = message; *p; ++p)  
    if (*p != ' ') *p += 1;
```

- (a) "t This is a tes"
- (b) "T h i s i s a t e s t"
- (c) "Uijt jt b uftu"
- (d) compiler error

14. What is the value assigned to p?

```
int odds[5] = { 1, 3, 5, 7, 9 };  
const int p = odds[1] + odds[2] + odds[3] + odds[4] + odds[5];
```

- (a) 25
- (b) 16
- (c) 9
- (d) runtime error

15. What is the final value of w?

```
#include <cmath>  
using std::sqrt;  
  
double square(double x) = x*x;  
double cube(double x) = x*x*x;  
  
int main() { const double u = 1.0/sqrt(2.0); const double v = square(u);  
const double w = cube(v); return 0; }
```

- (a) 0.125
- (b) 0.353553390593274
- (c) 0.5
- (d) compiler error

16. What values are assigned to ave and diff?

```
const unsigned int a = 237;  
const unsigned int b = 348;  
const unsigned int ave = (a+b)/2;  
const unsigned int diff = (a-b)/2;
```

- (a) 292,2147483592
- (b) 292.5,-55.5
- (c) 292,-55
- (d) 292,-56

17. What is written to the terminal?

```
const char text[] = "What does it all mean?";

int main()
{
    for (const char* p = text; !(*p == 0 or *(p+1) == 0); ++p)
        cout << *p++;
    cout << endl;
    return 0;
}
```

- (a) What does it all mean
- (b) W
- (c) Wa osi l en
- (d) runtime error

18. What value is assigned to x?

```
const double x = 1.0 + 5.0*(2/3);
```

- (a) 0.0
- (b) 1.0
- (c) 4.333333333333333
- (d) 4.0

19. What value is assigned to dp?

```
double dot_prod(int N, const double u[], const double v[])
{
    double sum = 0.0;
    do
```

```

    {
        sum += u[--N]*v[N];
    } while (N != 0);
    return sum;
}

int main()
{
    const double x[4] = { 0.0, 1.0, -1.0, 2.0 };
    const double y[4] = { -3.5, 3.0, -2.0, 5.0 };
    const double dp = dot_prod(4,x,y);
    return 0;
}

```

- (a) 15.0
- (b) 5.0
- (c) 3.0
- (d) compiler error

20. What value does the variable `d` hold when the program terminates?

```

#include <cassert>

int main()
{
    double d;
    assert(true);
    d = 5.0;
    assert(false);
    d = 10.0;
    return 0;
    d = 15.0;
}

```

- (a) 5.0
- (b) 10.0
- (c) 15.0
- (d) impossible to predict

21. What are the final values held in the array `list`?

```
void map(int (&f) (int), int a[], int N1, int N2)
{
    for (int n = N1; n < N2; ++n) a[n] = f(a[n]);
}

int times_two(int x) { return 2*x; }

int main()
{
    int list[5] = { 1, 2, 3, 4, 5 };
    map(times_two,list,1,4);
    return 0;
}
```

- (a) 2,4,6,4,5
- (b) 1,4,6,8,5
- (c) 2,4,6,8,5
- (d) 1,2,3,4,5

22. How many times will this loop execute?

```
for (unsigned int k = 100; k >= 0; --k);
```

- (a) 99 times
- (b) 100 times
- (c) 101 times
- (d) indefinitely