

C++ Exam: User-Defined vs Standard Conversions

Instructions

- Answer all questions.
- Write your answers in the space provided.
- For code-related questions, predict the output or explain the behavior.
- Time limit: 60 minutes.

Questions

1. What is the difference between a **standard conversion** and a **user-defined conversion** in C++? Provide an example of each.
2. Consider the following code:

```
1 void f(int) { std::cout << "A"; }
2 void f(double) { std::cout << "B"; }
3
4 int main() {
5     f(3.14f);
6 }
```

What is the output of this program, and why?

3. What is the output of the following code?

```
1 void f(const std::string &) { std::cout << "A"; }
2 void f(const void *) { std::cout << "B"; }
3
4 int main() {
5     f("hello");
6 }
```

4. Explain why the compiler prefers **standard conversions** over **user-defined conversions** during overload resolution.

5. What is the output of the following code?

```
1 struct MyStruct {
2     operator int() const { return 42; }
3 };
4
5 void g(int) { std::cout << "C"; }
6 void g(double) { std::cout << "D"; }
7
8 int main() {
9     MyStruct s;
10    g(s);
11 }
```

6. What is **integral promotion** in C++? Provide an example.

7. What is the output of the following code?

```
1 void f(int) { std::cout << "A"; }
2 void f(long) { std::cout << "B"; }
3
4 int main() {
5     short x = 10;
6     f(x);
7 }
```

8. What is **signed integer overflow**, and why is it considered undefined behavior in C++?

9. What is the output of the following code?

```
1 void f(int) { std::cout << "A"; }
2 void f(unsigned int) { std::cout << "B"; }
3
4 int main() {
5     f(-10);
6 }
```

10. What is the purpose of the **explicit** keyword in C++? Provide an example.

11. What is the output of the following code?

```
1 void f(const char *) { std::cout << "A"; }
2 void f(const std::string &) { std::cout << "B"; }
3
4 int main() {
5     const char *str = "hello";
6     f(str);
7 }
```

12. What is the difference between `static_cast` and `reinterpret_cast` in C++? Provide an example of each.

13. What is the output of the following code?

```
1 void f(int) { std::cout << "A"; }
2 void f(double) { std::cout << "B"; }
3
4 int main() {
5     f('a');
6 }
```

14. What is the output of the following code?

```
1 void f(int) { std::cout << "A"; }
2 void f(long) { std::cout << "B"; }
3
4 int main() {
5     f(3.14);
6 }
```

15. What is the output of the following code?

```
1 void f(int) { std::cout << "A"; }
2 void f(double) { std::cout << "B"; }
3
4 int main() {
5     f(3.14f);
6 }
```

16. What is the output of the following code?

```
1 void f(const std::string &) { std::cout << "A"; }
2 void f(const void *) { std::cout << "B"; }
3
4 int main() {
5     std::string s = "hello";
6     f(s.c_str());
7 }
```

17. What is the output of the following code?

```
1 void f(int) { std::cout << "A"; }
2 void f(double) { std::cout << "B"; }
3
4 int main() {
5     f(42L);
6 }
```

18. What is the output of the following code?

```
1 void f(int) { std::cout << "A"; }
2 void f(unsigned int) { std::cout << "B"; }
```

```
3
4 int main() {
5     f(10U);
6 }
```

19. What is the output of the following code?

```
1 void f(int) { std::cout << "A"; }
2 void f(double) { std::cout << "B"; }
3
4 int main() {
5     f(true);
6 }
```

20. What is the output of the following code?

```
1 void f(const char *) { std::cout << "A"; }
2 void f(const std::string &) { std::cout << "B"; }
3
4 int main() {
5     f(std::string("hello"));
6 }
```

End of Exam

Good luck!