DigiPen
INSTITUTE OF TECHNOLOGY

Pointers

Exercises

CS185

For these exercises, you can assume that the sizes of the data types (in bytes) are as follows: char = 1, short = 2, int = 4, long = 4, float = 4, double = 8. You may also assume that pointers are 4 bytes.

1. Given the following variables

```
int i = 0;
int j = 7;
int *pi = &i;
```

Which of the following lines of code are legal?

- ☐ pi = &j;
- ☐ pi = *j;
- ☐ *pi = j;
- ☐ pi = 7;
- ☐ j = π
- ☐ j = *pi;

2. Will the following code compile?

Code

```
int main(void)
{
      char c = 65;
      int *p;
      p = &c;
      *p = 66;

      return 0;
}
```

- ☐ Yes
- ☐ No

3. What does the following code print out?

Code

```
#include <iostream>

int main(void)
{
	short int a[3];
	unsigned short int b[3];
	float c[7];
	int d[] = { 1, 2, 3, 4, 5 };
	char *e;
	int *f;

	std::cout << sizeof(a) << std::endl;
	std::cout << sizeof(b) << std::endl;
	std::cout << sizeof(c) << std::endl;
	std::cout << sizeof(d) << std::endl;
	std::cout << sizeof(e) << std::endl;
	std::cout << sizeof(f) << std::endl;
	std::cout << sizeof(a[0]) << std::endl;
	std::cout << sizeof(b[2]) << std::endl;
	std::cout << sizeof(*c) << std::endl;
	std::cout << sizeof(*e) << std::endl;

	return 0;
}
```

Answer

4. What does the following code print out?

Code	

```
#include <iostream>

void Function(int i)
{
	i = 5;
}

int main(void)
{
	int i = 0;
	Function(i);
	std::cout << i << std::endl;

	return 0;
}
```

Answer	

5. What does the following code print out?

Code	

```
#include <iostream>

void Function(int *pi)
{
	*pi = 5;
}

int main(void)
{
	int i = 0;
	Function(&i);
	std::cout << i << std::endl;

	return 0;
}
```

Answer	

6. What does the following code print out?

Code	

```
#include <iostream>

int main(void)
{
      int i = 0;
      int *p = &i;
      int *q = p;

      *q = 30;
      std::cout << i << std::endl;

      return 0;
}
```

Answer	

7. Given the declarations below:

```
int a[10] = {5,8,3,2,1,9,0,4,7,6};
int *p = a + 2;
```

Give the equivalent expression using **a**

Expression with p	Equivalent expression with a
p	a + 2
p[0]	
*p	
p + 3	
*p + 5	
*(p + 6)	
p[6]	
p[-1]	
p[9]	

8. Given the declarations below, give the precise type of each expression and the value of the expression. If the expression is illegal, write **ILLEGAL** in the type column and leave the value blank. Assume that the address of the array **a** is 300 and the address of p is 100. Note that p doesn't change as there are no assignments or side-effect operations. (Hint: Draw a diagram to help you with the questions.)

```
int a[8] = {3,7,2,9,3,5,3,6,9};
int *p = a + 3;
```

Expression	Type	Value
p	pointer to int	312
p[1]		
*p		
&p[3]		
p + 4		
*p + 3		
*p[1]+1		
*(p + 2)		
p[-1]		

9. Given the declarations below, what is printed for each expression? All expressions are legal.

```
int a[9] = {3,7,2,9,3,5,3,6,9};
int *p = a + 1;
int *q = a + 4;
```

Expression	Output
std::cout << *(p + 3);	
std::cout << *q;	
std::cout << p[1] - q[2];	
std::cout << q - p;	

10. Given the declarations below, if the assignment is legal (meaning there is no compiler warning or error) write OK next to it. If the assignment is illegal (meaning there is a compiler warning or error) put an X next to it.

```
int i = 5;
int j = 6;
const int ci = 10;
const int cj = 11;

int *pi;
const int *pci;
int * const cpi = &i;
const int * const cpci = &ci;
```

Declaration	Legal / Illegal
i = 6;	
pci = &ci;	
cpci = &j;	
pi = &i;	
*cpci = 10;	
cpi = &j;	
*cpi = 10;	
cj = 9;	
j = 7;	
ci = 8;	
*pi = 8;	
pi = &j;	
*pci = 8;	
pci = &cj;	
*cpi = 11;	
*pci = 9;	
*pi = 9;	