

Name and SSN:

KEY

Instructor's Name:

Andrew Charles Breiner

Question	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
Total:	100	

1. (10 points) Indicate which of the following are valid type **int**, **double**, **char** constants in C and which are not. Identify the data type of each valid constant. (Question (1) of Self-Check on page 44 in section 2.2)

Solution:

15	int	'XYZ'	not valid	'*'	char
\$	not valid	25.123	double	15.0	double
-999	int	.123	double	'x'	char
"X"	not valid	'True'	not valid	'-5'	not valid
32e-4	double				

2. (10 points) Show the output displayed by the following program lines when the data entered are 5 and 7: (Question (1) of Self-Check on page 54 in section 2.3)

```
printf("Enter two integers> ");
scanf("%d%d", &m, &n);
m = m + 5;
n = 3 * n;
printf("m = %d\nn = %d\n", m, n);
```

Solution:

m = 10

n = 21

3. (10 points) Show the contents of memory before and after the execution of the program lines shown in question 2. (Question (2) of Self-Check on page 54 in section 2.3)

Solution:

	Mem Before	Mem After
m	5	10
n	7	21

4. (10 points) Do a step-by-step evaluation of the expressions that follow if the value of celsius is 3 and salary is 12400.00. (Question (2) of Self-Check on page 71 in section 2.5)

Solution:

$1.8 * \text{celsius} + 32.0$

$1.8 * 3 + 32.0 = 5.4 + 32.0 = 37.4$

$(\text{salary} - 5000.00) * 0.20 + 1425.00$

$(12400.00 - 5000.00) * 0.20 + 1425.00 = 7400.00 * 0.20 + 1425.00 = 1480.00 + 1425.00 = 2905.00$

5. (10 points) Let a , b , c , and x be the names of four type double variables, and let i , j , and k be the names of three type int variables. Each of the following statements contains one or more violations of the rules for forming arithmetic expressions. Rewrite each statement so that it is consistent with these rules. (Question (6) of Self-Check on page 72 in section 2.5)

Solution:

a. $x = 4.0 a * c$; **$x = 4.0 * a * c$;**

b. $a = ac$; **$a = a * c$;**

c. $i = 5j3$; **$i = 5 * j * 3$;**

d. $k = 3(i + j)$; **$k = 3 * (i + j)$;**

e. $x = 5a + bc$; **$x = 5 * a + b * c$;**

6. (10 points) Write the `#define` preprocessor directive and declarations for a program that has a constant macro *PI* (3.14159) and variable *radius*, *area*, and *circumf* declared as double, variable *num_circ* as an int, and variable *circ_name* as a char. (Question (1) of Programming on page 44 in section 2.2)

Solution:

```
/* Name: Andrew Charles Breiner
 * Homework 1
 * Section 2.2, Page 44, Program 1
 * Defines a constant macro and declares variables.
 */

#include <stdio.h> /* printf, scanf definitions */
#define PI 3.14159 /* defines constant macro, PI */

int main(void) {
    double radius, area, circumf; /* declares type double variables */
    int num_circ; /* declares num_circ as type int */
    char circ_name; /* defines type char to circ_names */

    return 0;
} //main
```

7. (10 points) Write a statement that asks the user to type three integers and another statement that stores the three user responses into *first*, *second*, and *third*. (Question (1) of Programming on page 54 in section 2.3)

Solution:

```
/* Name: Andrew Charles Breiner
 * Homework 1
 * Section 2.3, Page 54, Program 1
 * Ask user for three integers and stores them.
 */

#include <stdio.h> /* printf, scanf definitions */

int main(void) {
    int first, second, third; /* declares as type int */

    /*Ask user for three integers */
    printf("Please enters three integer values: ");
    scanf("%d%d%d", &first, &second, &third);

    return 0;
} //main
```

8. (10 points) Write a program that asks the user to enter the radius of a circle and then computes and displays the circle's area. Use the formula

$$Area = PI \times Radius \times Radius$$

where PI is the constant macro 3.14159. (Question (3) of Programming on page 55 in section 2.3)

Solution:

```
/* Name: Andrew Charles Breiner
 * Homework 1
 * Section 2.3, Page 54, Program 3
 * Asks user to input radius and computes area of circle.
 */

#include <stdio.h> /* printf, scanf definitions */
#define PI 3.14159 /* constant for PI */

int main(void) {
    double area, radius; /* declares as type double */

    /* Ask user for the radius */
    printf("Please enter the value of the radius: ");
    scanf("%lf", &radius);

    /* Compute the area of the circle */
    area = PI * radius * radius;

    /* Output the area of the circle */
    printf("The area of your circle is %f inches.\n", area);
    return 0;
} //main
```

9. (10 points) Write a program that estimates the temperature in a freezer (in $^{\circ}\text{C}$) given the elapsed time (hours) since a power failure. Assume this temperature (T) is given by

$$T = \frac{4t^2}{t + 2} - 20$$

where t is the time since the power failure. Your program should prompt the user to enter how long it has been since the start of the power failure in whole hours and minutes. Note that you will need to convert the elapsed time into hours. For example, if the user entered 2 30 (2 hours 30 minutes), you would need to convert this to 2.5 hours. (Question 3 of Programming on page 91 in Chapter 2 review)

Solution:

```
/* Name: Andrew Charles Breiner
 * Homework 1
 * Chapter 2, Page 91, Program 3
 * Estimates the temp. in a freezer after power failure.
 */

#include <stdio.h> /* printf, scanf definitions */

int main(void) {
    double T, t; /* declares as type double */
    int hours, minutes; /* declares as type int */

    /* Asks user for hours and minutes the compute time */
    printf("Enter the number of whole hours and minutes since the\n");
    printf("start of the power failure: ");
    scanf("%d%d", &hours, &minutes);
    t = hours + minutes / 60.0;

    /* Compute temperature */
    T = (4 * t * t) / (t + 2) - 20;

    /* Output temperature */
    printf("The temp. of your freezer due to the power outage");
    printf("is %f degrees Celsius.\n", T);

    return 0;
} //main
```

10. (10 points) Write a program that takes the length and width of a rectangular yard and the length and width of a rectangular house situated in the yard. Your program should compute the time required to cut the grass at the rate of two square feet a second. (Question (9) of Programming on page 92 in Chapter 2 review)

Solution:

```
/* Name: Andrew Charles Breiner
 * Homework 1
 * Chapter 2, Page 92, Program 9
 * Input yard and house demensions and comput time needed to
 * mow the yard
 */

#include <stdio.h> /* printf, scanf definitions */
#define MOW 2.0; /* Mowing speed */

int main(void) {
    double ylen, ywid, hlen, hwid; /* declares as type double */
    double yar, har, time; /* declares as type double */

    /* Asks user for yard and house width and lengh */
    printf("Enter the length and width of the yard: ");
    scanf("%lf%lf", &ylen, &ywid);
    printf("Enter the length and width of the house: ");
    scanf("%lf%lf", &hlen, &hwid);

    /* Compute area of yard/house and compute time needed to mow */
    yar = ylen * ywid;
    har = hlen * hwid;
    time = (yar - har) / MOW;

    /* Output time needed to mow */
    printf("The time needed to cute the grass is %.2f seconds.\n", time);

    return 0;
} //main
```