

NAME _____ Comp name _____

1. (20%) Write a function to compute $\sum_{k=1}^n \frac{1}{k} = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}$.

2. (18%) What is the output of the following code segments?

```
for (x = 0; x < 3; x++)  
    for (y = 0; y < 2; y++)  
        printf("%d, ", x + y);
```

```
for (x = 5; x > 3; x--)  
    printf("%d, ", x);
```

```
for (x = 1; x < 9; x = x * 2)  
    printf("%d, ", x);
```

```
x = 5;  
for (; x < 10; x = x + 3)  
    printf("%d, ", x);
```

```
for (x = 0; x < 8; x++)  
{  
    printf("%d, ", x);  
    x = x + 2;  
}
```

```
x = 0;  
do  
{  
    for (y = 10; y > 0; y = y - 3)  
        printf("%d, %d, ", x, y);  
    x = x + 2;  
}  
while (x < 6);
```

3. (20%) For each of the following code segments indicate what is the output. Assume the following declarations: `int w = 0, x = 10, y = 20, z = 30;`

a. `if (w == 0 && x * 2 > 20)`
 `printf ("True");`
 `else`
 `printf("False");` _____

b. `if (x == y - x && (w * z > 10 || y < 25))`
 `printf ("True");`
 `else`
 `printf("False");` _____

c. `if (k <= 15 && k > 15)`
 `printf ("False");`
 `else`
 `printf("True");` _____

f. `if (x <= 10 && y > 10)`
 `if (z == 20 || z != 30)`
 `printf ("Hi");`
 `else`
 `printf ("Hello");`
 `else`
 `if (y == 20)`
 `printf("How are you");` _____

g. `if (x = 20)`
 `if (x > 15)`
 `printf("Hi");`
 `else`
 `printf("Hello");`
 `else`
 `printf("Bye");` _____

4. (22%) What is the output of the following program?

```
int x = 1, y = 2, z = 3;
```

```
int bill(int x, int *k1)
```

```
{  
    int z = 50;
```

```
    z = z + x;
```

```
    z = z + y
```

```
    z = z + *k1;
```

```
    *k1 = *k1 + 1;
```

```
    y = y + 10;
```

```
    x = x + 20;
```

```
    z = z + 30;
```

```
    return z;
```

```
}
```

```
void main()
```

```
{  
    int a = 10; b = 20; c = 30, x = 40;
```

```
    c = bill(z, &b);
```

```
    printf("x = %d, y = %d, z = %d, a = %d, b = %d, c = %d, \n", x, y, z, a, b, c);
```

```
}
```

Output

5. (20%) What is the output of the following program?

```
#include "stdio.h"

int f(int n)
{
    if (n == 0 || n == 1)
        return 1;
    else
        return f(n - 1) + 2 * f(n - 2);
}

void main ( )
{
    printf(" f(%d) is %d\n", 3, f(3) );
}
```