Evaluate each of the following expressions and determine the **type** and the **value**: (10 points)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Expression</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>int a = 10, b = 20;</td>
<td>a + b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>int a = 3; double b= 3.5;</td>
<td>a + b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>char c = 'f'; int b = 4;</td>
<td>a + b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>float f = 5.0; int w = 3, z=5;</td>
<td>f + w / z;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>int d=5, e=4;</td>
<td>d – e ++</td>
<td></td>
<td></td>
</tr>
<tr>
<td>int d = 5, e = 4;</td>
<td>--d + e</td>
<td></td>
<td></td>
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<tr>
<td>int a=1, b=2, c=3, t=0</td>
<td>(short)a + (long)b + c * cos (t)</td>
<td></td>
<td></td>
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<tr>
<td>int a=10, x=20, y=30;</td>
<td>a * (x &lt; y)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>int x = 16; double y=3.5, z= 5.4</td>
<td>(x/3 &gt; 5) ? y : z</td>
<td></td>
<td></td>
</tr>
<tr>
<td>int t=5;</td>
<td>( t * 13 ) % 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For each of the code fragments below, write what the program displays in the box to the right. Unless otherwise specified, assume that all variables are integers. (10 points)

<table>
<thead>
<tr>
<th>Code Fragment</th>
<th>Display</th>
</tr>
</thead>
</table>
| ```c
for(i=0; i<7; i++) {
    for(j=0; j<i; j++) {
        printf("#");
    }
    printf("\n");
}
``` |         |
| ```c
for(i=50;;i++) {
    if(i<60) continue;
    if(i%7==0) break;
    printf("%d\n",i);
}
``` |         |
| ```c
int x=0, y=0, flip=0;
do {
    if(flip==1) {
        nx = x + 10;
    } else {
        ny = y + 10;
    }
    gfx_line(x,y,nx,ny);
    x = nx;
    y = ny;
    flip = 1 - flip;
} while( x<50 );
``` |         |
| ```c
int z = 9035768;
int u = 1;
int c, d;
while(1) {
    int c = z / u;
    int d = c % 10;
    if(c==0) break;
    printf("%d",d);
    if(u==100) printf("-\n");
    u = u*10;
} printf("\n");
``` |         |
For each of the following questions, write a function that computes the desired result. A good answer can fit in the available space, but use the back of the page if necessary.

Write a function that determines if an integer parameter is a prime number. The function should return true if it is prime, and false if it is not. (5 points)

Write a function that returns the following approximation for a parameter x. (5 points)

\[
\log(x) = (x - 1) - \frac{(x - 1)^2}{2} + \frac{(x - 1)^3}{3} - \ldots
\]
Suppose that you have a deck of unusual cards. The cards are numbered 1-9 and J for a “joker”. There are three of each kind of card, for a total of thirty cards. Each card is worth its face value in points, except the joker is worth negative 10 points. So, the hand 8, 5, J, 3 would be worth 6 points.

Write a program that asks the user to enter a particular score, then prints out all possible hands of four cards drawn from one deck with that score. (Don’t forget there are only three of each kind of card!) A good answer can fit in the space available. (10 points)