Answer questions as indicated. Closed book/Closed Notes. NO calculators.

1 Basic Concepts—20 points
Circle the correct answer. Each problem in this section is worth 2 points.

2 Arithmetic Operations—20 points
Fill in the blank. Each problem in this section is worth 4 points. What is the value of $k$ in the following statements using integer arithmetic.

Problem 1. $k = 3 + 9 \% 5 - 6$

Problem 2. $k = 7 / 6 + 7 \% 6$

Problem 3. $k = (7 / 6) * (9 \% 7)$

Problem 4. $k = (11 + 6) < (7 * 3)$

Problem 5. $k = (’5’ - ’1’) + (’7’ - ’2’)$

3 Program Statements—10 points
In problems 16–20, show all additional variable names and types that you choose to use.

Problem 6. Write a statement that will convert $x$ pounds to $y$ grams (recall: 454 g = 1 lb).

Problem 7. Write two statements for calculating the circumference of a circle, given the radius (recall $A = \pi r^2$ and $\pi = 3.14$).

Problem 8. Write a statement that will convert $n$ inches to $f$ feet (recall: 1 ft = 12 in).

Problem 9. Write a statement that can be used to calculate the volume of a sphere, given the radius $V = \frac{4}{3}\pi r^3$.

Problem 10. Write a statement that can be used to calculate the volume of a cylinder $V = \pi r^2h$. 
4 Program Analysis—20 points

Fill in the blanks. Two points each. Problem 22 refers back to problem 21.

Problem 11. double x = 5; declares that x is a ________ variable.
Problem 12. cout << "k: " << x*5; will write: _________.
Problem 13. char ch = '3'; declares that ch is a ________ variable.
Problem 14. long b = 3; declares that b is a ________ variable.
Problem 15. long m; m = 3.1*4;
cout << "m: " << m; will write: _________.

Problem 16. There are at least five errors in the program below. Circle five and only five of them. Each error is worth two points.

```cpp
// test1.cpp
#include <iostream.h>

main()
{
    integer j, k;
    double x, y;

    cout << "Enter two numbers: ";
cin >> x, y;
cout << x << y;
    //read values
    cout << "Enter two more numbers: ";
cin >> k, j;
double a = x + y;
double b = k * j;
if( a => b )
    cout << "product is less than sum" << endl;
else
    cout << "product is greater than sum";
return 0;
}
```
Problem 17 (10 points). Write a program that converts a line of data containing three integers so that the data appears on three separate lines.
Problem 18 (20 points). Write a complete program that reads three numbers, adds 3.14 to each of them, and writes the result to the standard output stream if the result is greater than 10.

Bonus Problem: Two points. Character arithmetic: What value does \( i \) have after executing this statement: \( i = '8' - '4'; \)