

- A1 2
641
- A2 6
3
- A3 NT
false
- A4 Syntax error in `i3 = i2 / r2;` because you cannot assign a double to an int w/o casting.
- A5 0
-22
- A6 4
21
- A7 false
case 3
- A8 cdefg
false *(two different object references)*
- A9 1002030
3410020
- A10 false
false

Question B.1) Something like this:

```
Department dept = new Department("R&D", 2000000);
Employee e1 = new Employee("John", 3);
Employee e2 = new Employee("Debbie", 2);
dept.assign(e1);
dept.assign(e2);
int count = dept.getHeadCount();
if (count > 10)
{
    int delta = (int) (0.05 * dept.getBudget()); // or 100000
    dept.changeBudget(delta);
} else
{
    int delta = (int) (0.02 * dept.getBudget()); // or 40000
    dept.changeBudget(-delta);
}
```

Question B.2) Input and validation can be done like this:

```
IO.print("Enter a string: ");
String entry = IO.readLine();
SE.require(entry.length() < WIDTH, "String too long!");
```

or like this:

```
if (entry.length() >= WIDTH)
{
    IO.println("String too long!");
} else
{
    ...
}
```

Output generation can be done like this:

```
IO.fillChar = '+';
IO.println(entry, "C"+WIDTH);
```

or like this:

```
final String PLUS = IO.repeat(WIDTH, '+');
int left = (WIDTH - entry.length()) / 2;
int right = WIDTH - entry.length() - left;
IO.print(PLUS.substring(0, left));
IO.print(entry);
IO.println(PLUS.substring(0, right));
```

or via loops.

Question B.3) Input and validation can be done like this:

```
final int MAX = 6;
final int INITIAL_BALANCE = 10;
final int WIN = 2;
Random rng = new Random();
int balance = INITIAL_BALANCE;
IO.println("Enter a guess...");
int guess = IO.readInt();

for (; balance > 0 && guess >= 1 && guess <= MAX; )
{
    int rand = 1 + rng.nextInt(MAX);
    if (guess == rand)
    {
        balance = balance + WIN;
    } else
    {
        balance = balance - WIN;
    }
    int guess = IO.readInt();
}
IO.println("Final balance = " + balance);
```

The `readInt` statement could optionally be absorbed in the first and last parts of the `for`; viz.

```
for (int guess = IO.readInt();
     balance > 0 && guess >= 1 && guess <= MAX;
     guess = IO.readInt())
{
    int rand = 1 + rng.nextInt(MAX);
    if (guess == rand)
    {
        balance = balance + WIN;
    } else
    {
        balance = balance - WIN;
    }
}
```