Additional OOP exercises (inheritance)
week 4 – 8 January 2016

Use classes and inheritance for all exercises.

1. Employment record.

Write a program that handles employee records in a company. You must decide what type of employee information to store and what type of classes to use.

- Some employees work only on day shifts. Others work on day and night shifts. There should be a different pay rate for working on day vs night shifts. You are free to choose the day shift pay rate; the night shift pay rate should be double the day pay rate.
- Some employees are shift supervisors: they supervise day and night shift workers, and their salary is decided as follows:
    - Their pay rate is double the corresponding day & night rates for shift workers.
    - They earn a yearly bonus when they supervise a certain amount of shift hours per year; the bonus is +10% of their monthly salary for supervising at least 500 hours of day shift work per year, and/or +15% of their monthly salary for supervising at least 300 hours of night shift work per year. You can assume that they work the same amount and type of hours every month.
    - The two bonuses can be combined into a super yearly bonus of 30% if the shift supervisor fulfills the above two conditions and if he has worked in the company for at least 5 years. If the two conditions are met but the shift supervisor has worked in the company for less than 5 years, the combined bonus will be 25%.

Create instances of shift workers and supervisors to whom you assign automatically random work hours, shift types and time of employment in the company. The program should output their monthly and yearly salary. The program should also inform supervisors who have not received a bonus how many more hours of day and/or night shift they need to supervise and/or how many more months they should work in the company in order to get a bonus (and what type of bonus they would get in each case).

2. Trivia game.

Create a game of trivia questions for two players. The program should work like this:

- Starting with player 1, each player gets a turn at answering a trivia question. There should be a total of 10 turns at answering questions, swapping from player 1 to player 2 each time.
- For each question asked, four possible answers are given. Only one of the answers is correct, and if the player selects the correct answer, he earns one point.
- After answers have been selected for all the questions, the program displays the number of points earned by each player and declares the player with the highest number of points the winner.

The questions can belong to three different subjects: science, arts, and popular culture.

- For science questions, the player has the option to select two easier questions for 0.5 point each, instead of one question of unknown difficulty for one point.

- For arts questions, the player has the option to be asked two questions at the same time, instead of one; if he answers both correctly, he gets three points; if either of the answers is incorrect, he gets no points at all. Question difficulty does not apply to this category of questions.
- For popular culture questions, the player has the option to have (a) pictorial and/or (b) audio and/or (c) video aids in answering a question. If the player chooses them, the following penalties apply:
    - if he answers correctly, -0.5 points for (a), -0.6 points for (b), -0.7 points for (c);
    - if he answers incorrectly, -0.6 points for (a), -0.7 points for (b), -0.8 points for (c).

  Question difficulty does not apply to this category of questions.

Create players to play the game. The questions they are asked should be selected randomly from each of the three subjects. The answers they give should be generated randomly.

3. Publicity event.

You are organising a publicity event to launch a new product and you wish to have maximum coverage in the media. To do this, you must select your guests wisely. There is only space to invite 50 guests. Each guest has a name, probability of accepting your invitation, and "*media currency"* (measured as minutes of media exposure per month). Guests can be divided into the following groups:

- Group 1: these guests have a low probability of accepting your invitation (low probability means 0.1 – 0.4) but very high media currency (500 – 700 minutes per month).
- Group 2: these guests have a probability of accepting your invitation of 0.5 – 0.8, and a media currency of 300 – 400 minutes per month.
- Group 3: these guests have a probability of accepting your invitation of 0.9 – 1.0, and a media currency of 1 – 200 minutes per month.

When instantiating guests from each group, you can randomly assign values to their probability of accepting and to their media currency from the ranges specified in each group. Each guest who attends the event, regardless of group, costs 1000 kr. for catering. In addition, each invitation that is sent out, regardless of whether it is accepted or rejected, costs 200 kr. in administration expenses. Which combination(s) of guests are likely to yield the most press coverage for your event at the lowest possible expense?