

# Abstraction

## CMPT 140

Abstraction is  
the strategic removal of  
detail from an algorithm

# Exercise 1

Which algorithm is more abstract and why?

(a) i)

```
1  Algorithm ReplaceToiletPaper:
2
3  find new toilet paper roll
4  remove empty roll from paper roll holder
5  put new toilet paper roll onto paper roll holder
6  toss empty roll container
```

ii)

```
1  Algorithm ReplaceToiletPaper:
2
3  find new toilet paper roll
4  replace empty roll with new toilet paper roll
5  toss empty roll container
```

## Exercise 1 (ctn'd)

(b) i)

```
1  Algorithm MakeSnowman:  
2  
3  roll three balls of snow  
4  stack balls of snow  
5  put sticks in middle ball for arms
```

ii)

```
1  Algorithm MakeSnowman:  
2  
3  roll large ball of snow  
4  roll medium ball of snow  
5  roll small ball of snow  
6  put medium ball of snow on top of large ball of snow  
7  put small ball of snow on top of medium ball of snow  
8  put sticks in middle ball for arms
```

## Exercise 1 (ctn'd)

(c) i)

```
1 Algorithm DealCards:
2
3 for each player in the game:
4     deal the player five cards
```

ii)

```
1 Algorithm DealCards:
2
3 for each player in the game:
4     while player has not been dealt five cards:
5         draw a card from the top of the deck
6         give the player the drawn card
```

## Exercise 2

- (a) Write a **refinement** of the following algorithm by refining each action.

```
1 Algorithm BedTime:
2
3   change into pajamas
4   brush teeth
5   lie down in bed
```

## Exercise 3

Perform encapsulations on the following algorithms:

(a) Perform at least one encapsulation.

```
1 Algorithm CallEmergencyNumber:
2
3 find nearest phone
4 pick up phone receiver
5 press '9' on dial pad
6 press '1' on dial pad
7 press '1' on dial pad
8 wait for emergency operator to pick up
```

## Exercise 3 (ctn'd)

(b) Perform at least two encapsulations.

```
1  Algorithm FireCannon:
2
3  bring cannonball to cannon
4  drop cannonball into cannon
5  pack cannonball tightly into cannon
6  run to back of cannon
7  find and grab cannon's rope trigger
8  pull cannon rope trigger to fire cannonball
```