1- Install k8s cluster (minikube)

```
menna@docker:~$ minikube version
minikube version: v1.35.0
commit: dd5d320e41b5451cdf3c01891bc4e13d189586ed-dirty
```

2- Create a pod with the name redis and with the image redis.

```
menna@docker:~$ vim redis.yaml
apiVersion: v1
kind: Pod
metadata:
  name: redis
spec:
  containers:
  - name: redis-container
    image: redis

~
~
~
~
~
~
~
~
~
~
~
menna@docker:~$ kubectl apply -f redis.yaml

pod/redis created
```

3- Create a pod with the name nginx and with the image "nginx123" Use a pod-definition YAML file

```
menna@docker:~$ vim ngnix.yaml
apiVersion: v1
kind: Pod
metadata:
  name: nginx
spec:
  containers:
  - name: nginx-container
    image: nginx123
```

```
menna@docker:~$ kubectl apply -f ngnix.yaml

pod/nginx created
```

4- What is the nginx pod status?

```
menna@docker:~$ kubectl get pod nginx
NAME     READY    STATUS             RESTARTS    AGE
nginx    0/1      ImagePullBackOff   0           9m26s
```

5- Change the nginx pod image to "nginx" check the status again

```
menna@docker:~$ kubectl set image pod/nginx nginx-container=nginx
pod/nginx image updated
menna@docker:~$ kubectl get pod nginx
NAME     READY    STATUS             RESTARTS    AGE
nginx    0/1      ImagePullBackOff   0           10m
```

6- How many ReplicaSets exist on the system? **NONE**

```
menna@docker:~$ kubectl get replicasets
No resources found in default namespace.
```

7- create a ReplicaSet with

name= replica-set-1

image= busybox

replicas= 3

```
menna@docker:~$ vim replica-set-1.yaml
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: replica-set-1
spec:
  replicas: 3
  selector:
    matchLabels:
      app: busybox-app
  template:
    metadata:
      labels:
        app: busybox-app
    spec:
      containers:
      - name: busybox-container
        image: busybox
~
~
~
~
~
~
"replica-set-1.yaml" 17L, 289B
menna@docker:~$ kubectl apply -f replica-set-1.yaml
replicaset.apps/replica-set-1 created
```

After correcting:

```yaml
apiVersion: apps/v1
kind: ReplicaSet
metadata:
  name: replica-set-1
spec:
  replicas: 3
  selector:
    matchLabels:
      app: busybox-app
  template:
    metadata:
      labels:
        app: busybox-app
    spec:
      containers:
      - name: busybox-container
        image: busybox
        command: ["sh", "-c", "while true; do sleep 3600; done"]
```

8- Scale the ReplicaSet replica-set-1 to 5 PODs.

```
menna@docker:~$ kubectl scale replicaset replica-set-1 --replicas=5
replicaset.apps/replica-set-1 scaled
```

9- How many PODs are READY in the replica-set-1?

```
menna@docker:~$ kubectl get pods -l app=busybox-app
NAME                    READY   STATUS            RESTARTS        AGE
replica-set-1-fxvqm     0/1     Completed         3 (40s ago)     80s
replica-set-1-nwbwn     0/1     Completed         2 (25s ago)     36s
replica-set-1-xgbg9     0/1     Completed         3 (43s ago)     80s
replica-set-1-xnk4s     0/1     CrashLoopBackOff  3 (17s ago)     80s
replica-set-1-xqfgm     0/1     Completed         2 (27s ago)     36s
```

After correcting:

```
menna@docker:~$ kubectl get pods -l app=busybox-app
NAME                               READY   STATUS    RESTARTS   AGE
deployment-1-74865bfcb7-26qv5      1/1     Running   0          17s
deployment-1-74865bfcb7-w6dvq      1/1     Running   0          17s
deployment-1-74865bfcb7-wngql      1/1     Running   0          17s
replica-set-1-54dc7                1/1     Running   0          5m39s
replica-set-1-886fz                1/1     Running   0          5m39s
replica-set-1-jqgb4                1/1     Running   0          5m39s
```

10- Delete any one of the 5 PODs then check How many PODs exist now?

Why are there still 5 PODs, even after you deleted one? **Because that's the desired state and repliccaset ensures there is always 5 PODs**

```
menna@docker:~$ kubectl delete pod replica-set-1-xgbg9
pod "replica-set-1-xgbg9" deleted
menna@docker:~$ kubectl get pods -l app=busybox-app
NAME                   READY   STATUS             RESTARTS       AGE
replica-set-1-6wmw4    0/1     CrashLoopBackOff   1 (4s ago)     13s
replica-set-1-fxvqm    0/1     CrashLoopBackOff   8 (55s ago)    17m
replica-set-1-nwbwn    0/1     CrashLoopBackOff   8 (39s ago)    17m
replica-set-1-xnk4s    0/1     CrashLoopBackOff   8 (58s ago)    17m
replica-set-1-xqfgm    0/1     CrashLoopBackOff   8 (22s ago)    17m
```

```
menna@docker:~$ kubectl get pods -l app=busybox-app
NAME                               READY   STATUS    RESTARTS   AGE
deployment-1-74865bfcb7-26qv5      1/1     Running   0          17s
deployment-1-74865bfcb7-w6dvq      1/1     Running   0          17s
deployment-1-74865bfcb7-wngql      1/1     Running   0          17s
replica-set-1-54dc7                1/1     Running   0          5m39s
replica-set-1-886fz                1/1     Running   0          5m39s
replica-set-1-jqgb4                1/1     Running   0          5m39s
```

11- How many Deployments and ReplicaSets exist on the system?

```
menna@docker:~$ kubectl get deployments
No resources found in default namespace.
menna@docker:~$ kubectl get replicasets
NAME            DESIRED   CURRENT   READY   AGE
replica-set-1   5         5         0       19m
```

12- create a Deployment with

name= deployment-1

image= busybox

replicas= 3

```
menna@docker:~$ vim deployment-1.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: deployment-1
spec:
  replicas: 3
  selector:
    matchLabels:
      app: busybox-app
  template:
    metadata:
      labels:
        app: busybox-app
    spec:
      containers:
      - name: busybox-container
        image: busybox
menna@docker:~$ kubectl apply -f deployment-1.yaml
deployment.apps/deployment-1 created
```

After correcting:

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: deployment-1
spec:
  replicas: 3
  selector:
    matchLabels:
      app: busybox-app
  template:
    metadata:
      labels:
        app: busybox-app
    spec:
      containers:
      - name: busybox-container
        image: busybox
        command: ["sh", "-c", "while true; do sleep 3600; done"]
```

13- How many Deployments and ReplicaSets exist on the system now?

```
menna@docker:~$ kubectl get deployments
NAME            READY    UP-TO-DATE    AVAILABLE    AGE
deployment-1    0/3      3             0            70s
menna@docker:~$ kubectl get replicasets
NAME                      DESIRED    CURRENT    READY    AGE
deployment-1-b87584cd9    3          3          0        74s
replica-set-1             5          5          0        24m
```

14- How many pods are ready with the deployment-1?

```
menna@docker:~$ kubectl scale replicaset replica-set-1 --replicas=5
replicaset.apps/replica-set-1 scaled
menna@docker:~$ kubectl get pods -l app=busybox-app
NAME                                READY   STATUS     RESTARTS   AGE
deployment-1-74865bfcb7-26qv5       1/1     Running    0          3m44s
deployment-1-74865bfcb7-w6dvq       1/1     Running    0          3m44s
deployment-1-74865bfcb7-wngql       1/1     Running    0          3m44s
replica-set-1-54dc7                 1/1     Running    0          9m6s
replica-set-1-886fz                 1/1     Running    0          9m6s
replica-set-1-jqgb4                 1/1     Running    0          9m6s
replica-set-1-svx6n                 1/1     Running    0          23s
replica-set-1-vncqz                 1/1     Running    0          23s
```

15- Update deployment-1 image to nginx then check the ready pods again

```
menna@docker:~$ kubectl set image deployment/deployment-1 busybox-container=nginx
deployment.apps/deployment-1 image updated
menna@docker:~$ kubectl get pods -l app=busybox-app
NAME                             READY   STATUS             RESTARTS   AGE
deployment-1-69c66c74df-5nbsw    0/1     ContainerCreating  0          6s
deployment-1-69c66c74df-vdxmn    1/1     Running            0          11s
deployment-1-74865bfcb7-26qv5    1/1     Running            0          6m39s
deployment-1-74865bfcb7-w6dvq    1/1     Running            0          6m39s
deployment-1-74865bfcb7-wngql    1/1     Terminating        0          6m39s
replica-set-1-54dc7              1/1     Running            0          12m
replica-set-1-886fz             1/1     Running            0          12m
replica-set-1-jqgb4             1/1     Running            0          12m
replica-set-1-svx6n             1/1     Running            0          3m18s
replica-set-1-vncqz             1/1     Running            0          3m18s
menna@docker:~$ kubectl get pods -l app=busybox-app
NAME                             READY   STATUS        RESTARTS   AGE
deployment-1-69c66c74df-5nbsw    1/1     Running       0          23s
deployment-1-69c66c74df-g4ffc    1/1     Running       0          17s
deployment-1-69c66c74df-vdxmn    1/1     Running       0          28s
deployment-1-74865bfcb7-26qv5    1/1     Terminating   0          6m56s
deployment-1-74865bfcb7-w6dvq    1/1     Terminating   0          6m56s
deployment-1-74865bfcb7-wngql    1/1     Terminating   0          6m56s
replica-set-1-54dc7             1/1     Running       0          12m
replica-set-1-886fz            1/1     Running       0          12m
replica-set-1-jqgb4            1/1     Running       0          12m
```

16- Run kubectl describe deployment deployment-1 and check events

```
menna@docker:~$ kubectl describe deployment deployment-1
Name:                   deployment-1
Namespace:              default
CreationTimestamp:      Sat, 01 Mar 2025 22:41:26 +0200
Labels:                 <none>
Annotations:            deployment.kubernetes.io/revision: 2
Selector:               app=busybox-app
Replicas:               3 desired | 3 updated | 3 total | 3 available | 0 unavailable
StrategyType:           RollingUpdate
MinReadySeconds:        0
RollingUpdateStrategy:  25% max unavailable, 25% max surge
Pod Template:
  Labels:  app=busybox-app
  Containers:
   busybox-container:
    Image:      nginx
    Port:       <none>
    Host Port:  <none>
    Command:
      sh
      -c
      while true; do sleep 3600; done
    Environment:    <none>
    Mounts:         <none>
  Volumes:          <none>
  Node-Selectors:   <none>
  Tolerations:      <none>
Conditions:
  Type           Status  Reason
  ----           ------  ------
  Available      True    MinimumReplicasAvailable
  Progressing    True    NewReplicaSetAvailable
OldReplicaSets:  deployment-1-74865bfcb7 (0/0 replicas created)
NewReplicaSet:   deployment-1-69c66c74df (3/3 replicas created)
Events:
  Type    Reason             Age    From                   Message
  ----    ------             ----   ----                   -------
  Normal  ScalingReplicaSet  10m    deployment-controller  Scaled up replica set deployment-1-74865bfcb7 from 0 to 3
  Normal  ScalingReplicaSet  4m20s  deployment-controller  Scaled up replica set deployment-1-69c66c74df from 0 to 1
  Normal  ScalingReplicaSet  4m15s  deployment-controller  Scaled down replica set deployment-1-74865bfcb7 from 3 to 2
  Normal  ScalingReplicaSet  4m15s  deployment-controller  Scaled up replica set deployment-1-69c66c74df from 1 to 2
  Normal  ScalingReplicaSet  4m9s   deployment-controller  Scaled down replica set deployment-1-74865bfcb7 from 2 to 1
  Normal  ScalingReplicaSet  4m9s   deployment-controller  Scaled up replica set deployment-1-69c66c74df from 2 to 3
  Normal  ScalingReplicaSet  4m4s   deployment-controller  Scaled down replica set deployment-1-74865bfcb7 from 1 to 0
```

What is the deployment strategy used to upgrade the deployment-1? **RollingUpdate**

```
StrategyType:           RollingUpdate
```

17- Rollback the deployment-1

What is the used image with the deployment-1?

```
menna@docker:~$ kubectl rollout undo deployment/deployment-1
deployment.apps/deployment-1 rolled back
menna@docker:~$ kubectl describe deployment deployment-1 | grep Image
    Image:          busybox
```

18- Create a deployment using nginx image with latest tag only and remember to mention tag i.e nginx:latest and name it as nginx-deployment. App labels should be app: nginx-app and type: front-end. The container should be named as nginx-container; also make sure replica counts are 3.

```
menna@docker:~$ vim deployment-18.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
spec:
  replicas: 3
  selector:
    matchLabels:
      app: nginx-app
      type: front-end
  template:
    metadata:
      labels:
        app: nginx-app
        type: front-end
    spec:
      containers:
      - name: nginx-container
        image: nginx:latest
```

```
menna@docker:~$ kubectl apply -f deployment-18.yaml
deployment.apps/nginx-deployment created
menna@docker:~$ kubectl get deployments
NAME                READY   UP-TO-DATE   AVAILABLE   AGE
deployment-1        3/3     3            3           24m
nginx-deployment    3/3     3            3           37s
menna@docker:~$ kubectl get replicasets
NAME                          DESIRED   CURRENT   READY   AGE
deployment-1-69c66c74df       0         0         0       18m
deployment-1-74865bfcb7       3         3         3       25m
nginx-deployment-69b966d577   3         3         3       78s
replica-set-1                 5         5         5       30m
```