Problem Statement:

You have developed the model training code for in-vehicle coupon recommendation project using **XGBoost** in your local system.

Your task is to deploy this model to Google Cloud's Vertex AI. The high-level breakdown of your tasks is as below:

First set of tasks:
1. Train the model using Vertex AI Custom Training Job
2. Deploy the trained model to Vertex AI Model Registry for batch predictions.
3. Deploy the trained model to an endpoint for real-time online predictions.

Second set of tasks:
1. Run batch predictions against the uploaded model using the input file **test-batch.csv.**
2. Run online predictions against the deployed model endpoint.

Hints :

1 For Custom Training using XGBoost:
```
CustomTrainingJob(
    display_name="coupoon-recommendation-training",
    script_path="model-training-code.py",
    container_uri = "us-docker.pkg.dev/vertex-ai/training/xgboost-cpu.1-
1:latest",
    requirements=["gcsfs","category_encoders==2.6.1","imbalanced-
learn==0.11.0", "scikit-learn>=0.24.0"]
)
```

2 For Model uploading use:
serving_container_image_uri = "us-docker.pkg.dev/vertex-
ai/prediction/xgboost-cpu.1-6:latest"

3 Instance Array for testing online endpoint :

```
INSTANCE =[0,
 0,
 0,
 1,
 0,
 1,
 0,
 0,
 0,
 0,
 0,
 1,
 1,
 0,
 0,
 0,
 1,
 0,
 0,
 0,
 0,
 0,
 0,
 0,
 0,
 0,
 0,
 1,
 1,
 1,
 2,
 3,
 0,
 0,
 3,
 2,
 1,
 0,
 0]
```