Assignment #4 Report

Part B

Top 10 categories from AlexNet output:

```
1 ) moving van : 1034
2 ) fox squirrel, eastern fox squirrel, Sciurus niger : 607
3 ) sorrel : 336
4 ) container ship, containership, container vessel : 280
5 ) milk can : 264
6 ) English foxhound : 262
7 ) thresher, thrasher, threshing machine : 245
8 ) Japanese spaniel : 226
9 ) Dandie Dinmont, Dandie Dinmont terrier : 218
10 ) platypus, duckbill, duckbilled platypus, duck-billed platypus, Ornithorhynchus anatinus : 162
```

Confusion Matrix (Acronyms created by using first and last letter of word, or first letter of each word):

AlexNet CIFAR-10	CC	CCC	DD	EF	FES	JS	MC	MV	SL	TTT
AM	0	0	0	0	1	0	0	0	0	0
AP	0	0	0	0	0	0	0	1	0	0
B	0	0	0	0	0	0	0	0	1	0
C	0	1	0	0	0	0	0	0	0	0
DG	0	0	1	0	0	0	0	0	0	0
DR	0	0	0	1	0	0	0	0	0	0
FG	0	0	0	0	0	0	0	0	0	1
H	0	0	0	0	0	1	0	0	0	0
S	0	0	0	0	0	0	1	0	0	0
T	1	0	0	0	0	0	0	0	0	0

Part C

Training using a logistic regression

```
Start Training
train epoch[1/2] loss:0.749: 100%|██████████| 400/400 [06:25<00:00,  1.04it/s]
100%|██████████| 100/100 [01:37<00:00,  1.03it/s]
[epoch 1] train_loss: 0.883  val_accuracy: 0.736
train epoch[2/2] loss:0.707: 100%|██████████| 400/400 [07:13<00:00,  1.08s/it]
100%|██████████| 100/100 [02:07<00:00,  1.28s/it]
[epoch 2] train_loss: 0.715  val_accuracy: 0.751
  0%|          | 0/400 [00:00<?, ?it/s]
Finished Training
```

Evaluating classifier with train, validation, and testing partitions

```
Start Testing with train partition
100%|██████████| 400/400 [08:04<00:00,  1.21s/it]
  0%|          | 0/100 [00:00<?, ?it/s]
test_accuracy: 3.050
Start Testing with valadation partition
100%|██████████| 100/100 [02:05<00:00,  1.26s/it]
  0%|          | 0/100 [00:00<?, ?it/s]
test_accuracy: 0.751
Start Testing with test partition
100%|██████████| 100/100 [02:05<00:00,  1.26s/it]
test_accuracy: 0.750
```

Part D

Training using a logistic regression

```
Start Training
train epoch[1/2] loss:29.599: 100%|██████████| 400/400 [08:59<00:00,  1.35s/it]
100%|██████████| 100/100 [02:15<00:00,  1.35s/it]
[epoch 1] train_loss: 65.055  val_accuracy: 0.625
train epoch[2/2] loss:41.875: 100%|██████████| 400/400 [09:23<00:00,  1.41s/it]
100%|██████████| 100/100 [02:20<00:00,  1.40s/it]
[epoch 2] train_loss: 31.221  val_accuracy: 0.690
  0%|          | 0/400 [00:00<?, ?it/s]
Finished Training
```

Evaluating classifier with train, validation, and testing partitions

```
Start Testing with training partition
100%|██████████| 400/400 [08:51<00:00,  1.33s/it]
  0%|          | 0/100 [00:00<?, ?it/s]
test_accuracy: 2.771
Finished Training
Start Testing with validation partition
100%|██████████| 100/100 [02:13<00:00,  1.34s/it]
  0%|          | 0/100 [00:00<?, ?it/s]
test_accuracy: 0.690
Start Testing with test partition
100%|██████████| 100/100 [02:13<00:00,  1.34s/it]
test_accuracy: 0.689
```

Both classifiers were trained using 2 epochs. However the training loss for ‘fc7’ layer was significantly higher during the training phase. The accuracy however was similar and and differed by 0.1.

When testing with the training partition of the CIFAR10 data the ‘fc6’ had a higher accuracy. When testing with the validation partition of the CIFAR10 data the ‘fc6’ layer again had a higher accuracy. When testing with the test partition of the CIFAR10 data the ‘fc6’ layer once again had a higher accuracy. Clearly the ‘fc6’ classifier is more accurate. This is probably due to it being a fully connected layer and minimizing gradient loss.