Answer for 6(a)

In[1]:=
```
DSolve[{y'[x] == y[x]^2 Sin[x]^2}, y[x], x]
```

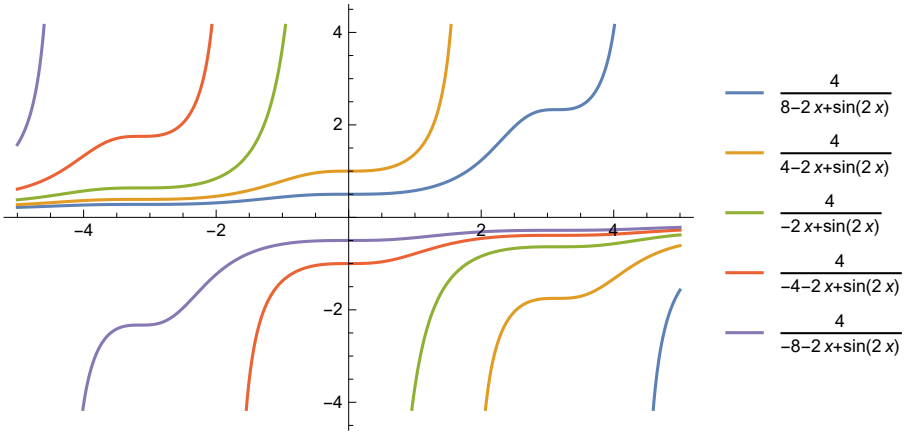
Out[1]=
$$\left\{\left\{y[x] \to \frac{4}{-2x - 4C_1 + \sin[2x]}\right\}\right\}$$

In[2]:=
```
sol = y[x] /. %1 /. C[1] → a
```

Out[2]=
$$\left\{\frac{4}{-4a - 2x + \sin[2x]}\right\}$$

In[3]:=
```
Plot[Evaluate[Table[sol, {a, -2, 2}]], {x, -5, 5}, PlotLegends → "Expressions"]
```

Out[3]=




Answer for 6(b)

In[4]:=
```
DSolve[{v'[t] - (1/5) v[t] Tan[t/5] == 20, v[0] == 1}, v[t], t]
```

Out[4]=
$$\left\{\left\{v[t] \to \text{Sec}\left[\frac{t}{5}\right] + 100\,\text{Tan}\left[\frac{t}{5}\right]\right\}\right\}$$

In[5]:=
```
v[t] /. %4 /. t → 3 // N
```

Out[5]=
```
{69.6253}
```

Answer for 6(c)

In[6]:=
```
NDSolve[{x'[t] == y[t]^(2) + x[t] y[t], 2 x[t]^(2) + y[t]^(2) == 1, x[0] == 0},
 {x[t], y[t]}, {t, 0, 5}]
```

Out[6]=
$$\{\{x[t] \to \text{InterpolatingFunction}[$$  $$][t],$$



$$y[t] \to \text{InterpolatingFunction}[$$  $$][t]\}\}$$

In[7]:=
```
Plot[{y[t], x[t]} /. %6, {t, 0, 5}]
```

Out[7]=