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1 % Sounak Ghosh
2 % 9/11/19
3 % ECE 202 - Fall 2019 - MATLAB Exercise M1
4 % Equation source: http://www.convertalot.com/elastic\_collision\_calculator.html
5 % MATLAB script to determine the final velocities of 2 carts after an
6 % elastic collision.
7
8
9 clear % clears all variables in the workplace; avoids common errors
10
11 % ----- given information -----
12
13 m1 = 250; % mass of the cart#1 in g
14 m2 = 150; % mass of the cart#2 in g
15 v1i = 40; % initial velocity of cart#1 in cm/s
16 v2i = -30; % initial velocity of cart#2 in cm/s
17
18
19 % ----- calculations -----
20 % (a)
21 M = m1 + m2; % total mass of cart#1 and cart#2 in g
22
23 v1f = (m1*v1i - m2*v1i + 2*m2*v2i)/ M % final velocity of cart#1 in cm/s
24 % using momentum conservation
25 % and kinetic energy
26 % conservation
27
28 v2f = (2*m1*v1i - m1*v2i + m2*v2i)/ M % final velocity of cart#2 in cm/s
29 % using momentum conservation
30 % and kinetic energy
31 % conservation
32
33 % ----- check answers -----
34 % (b)
35 check_p = m1*v1f + m2*v2f - (m1*v1i + m2*v2i) % The change in the total
36 % momentum of the system
37 % before & after the
38 % collision should be
39 % zero.
40 check_Energy = m1*v1f^2 + m2*v2f^2 - (m1*v1i^2 + m2*v2i^2)
41 % The change in the total
42 % energy of the system
43 % before & after the
44 % collision should be
45 % zero.
46
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>> M1
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```
v1f =
```

```
-12.5000
```

```
v2f =
```

```
57.5000
```

```
check_p =
```

```
0
```

```
check_Energy =
```

```
0
```

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>>
```