Exercise 3: Mc & TD

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1 Task 1

1.1 a)

Episode 1:

$$V_1(2,1) = 5$$
$$V_1(2,3) = 6$$
$$V_1(1,3) = 7$$
$$V_1(1,3) = 8$$
$$V_1(1,4) = 9$$
$$V_1(2,5) = 10$$

other states: 0

Episode 2:

$$V_2(2,1) = 5 + \frac{1}{2} * (-102 - 5) = -48.5$$

$$V_2(2,2) = 6 + \frac{1}{2} * (-101 - 6) = -47.5$$

$$V_2(2,3) = 7 + \frac{1}{2} * (-100 - 7) = -46.5$$

other state: unchanged

Episode 3:

$$V_3(2,1) = -48.5 + \frac{1}{3} * (-5 - (-48.5)) = -30.7$$

$$V_3(2,2) = -47.5 + \frac{1}{3} * (-6 - (-47.5)) = -29.7$$

$$V_3(2,3) = -46.5 + \frac{1}{3} * (-7 - (-46.5)) = -28.7$$

$$V_3(2,4) = 0 + \frac{1}{3} * (8 - 0) = 2.7$$

$$V_3(1,4) = 9 + \frac{1}{3} * (9 - 9) = 9$$

$$V_3(2,4) \leftarrow \text{no update, was visited before}$$

other state: unchanged

Values after 3 Episodes of first visit MC

0	0	8	9	10
-30.7	-29.7	-28.7	2.7	0
0	0	0	0	0

1.2 b)

TD-Error

$$\delta_4(2,1) = -1 + 0 - (30.7) = -29.7$$
$$\delta_4(1,1) = -1 + 0 - (0) = -1$$
$$\delta_4(1,2) = -1 + 8 - (0) = 7$$
$$\delta_4(1,3) = -1 + 9 - (8) = 0$$
$$\delta_4(1,4) = -1 + 10 - (9) = 0$$
$$\delta_4(1,5) = 10 + 0 - (10) = 0$$