IVT:

1)

t (sec)	0	15	25	30	35	50	60
v(t) (ft/sec)	−10	−15	−10	−7	−5	0	13

A toy car travels on a straight path. During the time interval $0 \le t \le 60$ seconds, the toy car's velocity v, measured in feet per second is a <u>continuous function.</u>

For $0 < t < 60$ must there be a time t when $v(t) = -2$?

✳ v is a continuous function

Yes, since v(35) = −5 < −2 < 0 = v(50),
Intermediate Value Theorem
guarantees a value, t, in (35, 50)
such that v(t) = −2.

2) Given the function h(x) is continuous:

$$f(2) = 5 \text{ and } f(5) = 2.$$

Let $h(x) = f(x) - x.$ Explain why there must be a value r for $2 < r < 5$ such that $h(r) = 0.$

x	2	5
h(x)	3	−3

h(2) = f(2) − 2 = 3
h(5) = f(5) − 5 = −3

✳ h(x) is continuous
Since h(5) = −3 < 0 < 3 = h(2),
then Intermediate Value Theorem
guarantees a value, r, in (2, 5)
such that h(r) = 0.