Question 1.

(i) If the graph is pictured of $f''(x)$

$f''(x)$ is zero at $x = 1$, $x = 4$ and $x = 7$

$f''(x)$ is negative before $x = 1$ and positive after $x = 1$. at $x = 1$ $f''(x)$ is defined

$f''(x)$ is positive before $x = 7$ and negative after $x = 7$. At $x = 7$ $f''(x)$ is defined

Conclusion : $x = 1$ and $x = 7$ are inflection points.

(ii) If the graph is pictured of $f'(x)$.

The derivative of the graph equals zero at $x = 2$, $x = 4$, $x = 6$.

x- Value	2	4	6
L·H sign of $f''(x)$	$-$	$-$	$+$
RH sign of $f''(x)$	$+$	$+$	$-$

Therefore inflection points are: $x = 2$, $x = 4$, $x = 6$

Question 2

An inflection point is where the concavity of a graph changes. In our case, the trajectory / trend of bitcoin price will change after six days. If the price was increasing at an increasing rate, it will start to increase at a decreasing rate.

Question 3

$$f(x) = \frac{1}{4}x^4 - x^3$$

(a) Domain : $(-\infty, \infty)$

$$\frac{1}{4}x^4 - x^3 = 0$$

$$\frac{1}{4}x^4 = x^3 \quad ; x = 0$$

$$\frac{1}{4}x = 1$$

$$x = 4$$

Zeros: $x = 0, \ x = 4$

=> No vertical asymptotes ; No point where denominator equals 0
=> No horizontal asymptotes
=> No oblique asymptotes ; The degree of the numerator is not one degree greater than the denominator

(b) $f'(x) = x^3 - 3x^2$

$x^3 - 3x^2 = 0$; $x = 0$

$x^3 = 3x^2$

$x = 3$

Critical Points: $x = 0$, $x = 3$

	$(-\infty, 0)$	0	$(0, 3)$	3	$(3, \infty)$
$f'(x)$	$-$	0	$-$	0	$+$

Intervals of Increase: $(3, \infty)$

Intervals of Decrease: $(-\infty, 0) \cup (0, 3)$

$f(0) = 0$

$f(3) = \frac{1}{4}(3^4) - 3^3 = \frac{-27}{4}$

Local minima: $\left(3, \frac{-27}{4}\right)$

(c) $f''(x) = 3x^2 - 6x$

$3x^2 - 6x = 0$; $x = 0$

$3x^2 = 6x$

$3x = 6$

$x = 2$

$f(0) = 0$

$f(2) = \frac{1}{4}(2^4) - 2^3 = -4$

	$(-\infty, 0)$	0	$(0, 2)$	2	$(2, \infty)$
$f''(x)$	$+$		$-$		$+$

Concave up: $(-\infty, 0) \cup (2, \infty)$

Concave down: $(0, 2)$

Inflection points: $(0, 0)$ and $(2, -4)$

(d)