Part I
Limits

Reporting about the behaviour of function within the range of its dangerous values

$$f(x) = x^2 + \frac{1}{x}$$

Input variable = x
Output variable = $f(x)$
Name of function = f
"Acceptable"/Permissible input values of x - All real numbers except zero

$$(x, f(x)), (x + h, f(x + h))$$
$$f(x + h) - \frac{f(x)}{x + h - x}$$
$$f(x + h) - \frac{f(x)}{h}$$

Proof

$$y = -16t^2 + 100t + 6$$

Points used: $(0, 6)$ $(1, 90)$ $(3, 162)$
When $t = 0$ and $y = 6$

$$y = at^2 + bt + c$$
$$6 = a(0)^2 + b(0) + c$$
$$c = 6$$

When $t = 1$ and $y = 90$

$$90 = a(1)^2 + b + 6$$
$$90 = a + b + 6$$
$$84 = a + b$$
$$84 - b = a$$

When $t = 3$ and $y = 162$

$$
\begin{aligned}
162 &= a(3)^2 + b + 6 \\
162 &= 9a + 3b + 6 \\
162 &= 9(84 - b) + 3b + 6 \\
162 &= 756 - 9b + 3b + 6 \\
-594 &= -6b + 6 \\
-600 &= -6b \\
b &= 100
\end{aligned}
$$

$$\therefore b = 100$$

$$
\begin{aligned}
84 - 100 &= a \\
a &= -16
\end{aligned}
$$

Therefore $a = 16$, $b = 100$ and $c = 6$

Given $f(x) = x^2$ find the Limit of $f(x)$ at $x = 3$