2.5

Q6

$$h(-1) = (g \circ f)(-1)$$
$$= g(f(-1))$$
$$= g(1)$$
$$= -4$$

$$h'(-1) = (g \circ f)'(-1)$$
$$= g'(f(-1)) \cdot f'(-1)$$
$$= g'(1) \cdot (-5)$$
$$= (-7)(-5)$$
$$= 35$$

Q14 Given: $h(x) = f(g(x))$, $f(u) = u^2 - 1$, $g(2) = 3$, $g'(2) = -1$.

Well, $h(x) = f(g(x))$

$\therefore$ $h'(x) = f'(g(x)) \cdot g'(x)$

So, $h'(2) = f'(g(2)) \cdot g'(2)$

$$= \underline{f'(3)} \cdot (-1)$$

$\longleftarrow$ We need $f'(3)$

$f(u) = u^2 - 1$

$f'(u) = 2u$

$$= (\underline{2(3)}) \cdot (-1)$$
$$= -6$$

(18) $y = (x^2+x-2)^3 + 3$

$y' = 3(x^2+x-2)^2(2x+1)$

Now @ $(1,3)$, $y' = 3(0)(3)$
$= 0$

So eq'n of tangent @ $(1,3)$ is $y = 3$.

Method #1

When $y = 3$, $(x^2+x-2)^3 = 0$

$(x+2)^3(x-1)^3 = 0$

$x = -2$ or 1

BUT @ $(-2,3)$, $y' = 3(0)(-3)$
$= 0$

So eq'n of tangent at $(-2,3)$ is also $y = 3$.

i.e. the tangent at $(1,3)$ is also the tangent @ $(-2,3)$

Method #2

When $y' = 0$

$$3(x^2+x-2)^2(2x+1)=0$$
$$3(x+2)^2(x-1)^2(2x+1)=0$$
$$x=-2,\ 1,\ \text{or } -\tfrac{1}{2}$$

When $x=-2,\ y=3$
$x=1,\ y=3$
$x=-\frac{1}{2},\ y\neq 3$

So, $y=3$ is tangent to the curve at $(-2,3)$ and $(1,3)$.