

20) Find the instantaneous rates of change of the given functions at the indicated points

$$f(r) = 3r^2 - 4r + 2, c = 3$$

$$m(r) = \lim_{h \rightarrow 0} \frac{f(t+h) - f(t)}{h}$$

$$= \lim_{h \rightarrow 0} \frac{[3(t+h)^2 - 4(t+h) + 2] - [3t^2 - 4t + 2]}{h}$$

$$= \lim_{h \rightarrow 0} \frac{[3(t^2 + 2th + h^2) - 4t - 4h + 2] - [3t^2 - 4t + 2]}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\cancel{3t^2} + 6th + 3h^2 - \cancel{4t} - 4h + 2 - \cancel{3t^2} + \cancel{4t} - 2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{6th + 3h^2 - 4h}{h}$$

$$= \lim_{h \rightarrow 0} 6t + 3h - 4$$

$$= \boxed{6t - 4}$$

Now find the rate of change when $m(3)$

$$6t - 4$$

$$6(3) - 4$$

$$18 - 4$$

$$= \boxed{14}$$

The instantaneous rate of change for $f(r) = 3r^2 - 4r + 2$ when $c = 3$ is 14.