

**Handout 5: Calculating Derivatives Using the Chain Rule**

Calculate the derivatives of the functions given in the table below.

<i>Function</i>	<i>Derivative</i>
$f(x) = (1 + x^2)^7$	
$f(x) = \sqrt{1 + 3x}$	
$h(t) = \sin(t^2 + t)$	
$l(z) = \frac{z}{(z^3 + 1)}$	

$q(s) = \sqrt{1 + \cos(s)}$	
$u(z) = \frac{1}{\sqrt{1 + 3^2}}$	
$v(t) = \left(t^{\frac{5}{2}} - \sqrt{t}\right)^\pi$	
$m(z) = \left(\tan(z) + z^2\right)^{-1}$	

**Answers:**

(a)  $7 \cdot (1 + x^2)^6 \cdot 2x$ .

(b)  $0.5 \cdot (1 + 3x)^{-0.5} \cdot 3$

(c)  $\cos(t^2 + t) \cdot (2t + 1)$ .

(d)  $[z^3 + 1 - z \cdot 3z^2] / (z^3 + 1)^2$ .

(e)  $0.5 \cdot (1 + \cos(s))^{-0.5} \cdot (-\sin(s))$ .

(f) 0.

(g)  $\pi \cdot (t^{5/2} - t^{1/2})^{\pi-1} \cdot (2.5 \cdot t^{1.5} - 0.5 \cdot t^{0.5})$ .

(h)  $-1 \cdot (\tan(z) + z^2)^{-2} \cdot (\sec^2(z) + 2z)$ .