9. (12 points) **(a)** Give the formula that defines the derivative of a function f at a point a.

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

(b) Using the definition of the derivative, write the formula for $f'(1)$ if $f(x) = (4+x)^x$

$$f'(1) = \lim_{h \to 0} \frac{(4+h)^{1+h} - (4+1)^1}{h}$$

$$= \lim_{h \to 0} \frac{(5+h)^{(1+h)} - 5}{h}$$

(c) Numerically approximate $f'(1)$ correct to at least three decimal places. To receive full credit, you must show the calculations you used to justify your answer.

For "small" values of h the formula

$$\frac{(5+h)^{(1+h)} - 5}{h}$$

h	
.1	9.1387
.01	9.0563
.001	9.0481
.0001	9.0473
.00001	9.0471
−.00001	9.0463
−.0001	9.0381
−.001	8.957...
−.01	

to 3 dec. places

$f'(1) \approx 9.047$