

1. An investor pays \$437 to buy an annuity that will make \$150 payments in 1, 2, and 3 years time. Find the interest rate. If you use a computer to aid with the calculations (e.g., <http://www.wolframalpha.com/>), be sure to verify the computed answer is correct.

2. Compute the following limits.

(a) $\lim_{x \searrow 0} (2x)^{(2x)}$

(b) $\lim_{x \rightarrow \infty} \frac{1}{\sqrt{4x^2 - 2x - 10} + 2x}$

3. Compute the derivatives of the following functions.

(a) $f(x) = \frac{1}{5 - x}$ (where is $f'(x)$ continuous?)

(b) $f(x) = \sum_{k=1}^{10} k e^{-a_k x^2}$ (the a_k are constants)

(c) $f(x) = \frac{\log\left(\frac{x}{K}\right) + \left(r - q + \frac{\sigma^2}{2}\right)(T - t)}{\sigma\sqrt{T - t}}$ ($K > 0$, r , q , $\sigma > 0$, and $T > t$ constant)

(d) $f(x) = \frac{\log\left(\frac{S}{K}\right) + \left(r - q + \frac{x^2}{2}\right)(T - t)}{x\sqrt{T - t}}$ ($S > 0$, $K > 0$, r , q , and $T > t$ constant)

4. Use l'Hôpital's rule to compute the following limits.

(a) $\lim_{x \searrow 0} \frac{\sin(3x^2)}{2x^2}$

(b) $\lim_{x \rightarrow \infty} \frac{\log(x^4)}{x}$