QUIZ # 3

Name (1p): ....
Problem: Differentiate the following functions:
(a) $f(x) = \ln((x-1)(x+1)(x+3)(x+5))$ (3 points)
(b) $g(x) = \ln(e^{x^2})$ (3 points)
(c) $h(x) = e^{x^2+x+1}$ (3 points)

Answer:
(a) Use natural logarithm's properties (namely the one stating that:

$$\ln(A \cdot B) = \ln(A) + \ln(B),$$

which reduces a product to a sum)

$$f(x) = \ln(x-1) + \ln(x+1) + \ln(x+3) + \ln(x+5)$$

and, using the chain rule for each ln we get:

$$f'(x) = \frac{1}{x-1} + \frac{1}{x+1} + \frac{1}{x+3} + \frac{1}{x+5}$$

(b) Again, use ln's properties (namely the one stating that:

$$\ln(A^B) = B\ln(A),$$

which reduces a power to a product)

$$g(x) = x^2 \ln(e);$$

but $\ln(e) = 1!!$ so

$$g(x) = x^2 \Rightarrow g'(x) = 2x$$

(c) Use only the fact that an exponential's derivative consists of: (**copy of itself**) $\times$ (derivative of power):

$$h'(x) = e^{x^2+x+1} \cdot (2x+1)$$

Done!