

Quiz #4

1. Calculate each of the following limits. Show your work or supply evidence for your answers – no work or evidence = no credit.

(a) (1.5 points) $\lim_{x \rightarrow \infty} \frac{x^5 + 2}{x^4 + x^2 + 1}$

(b) (1.5 points) $\lim_{x \rightarrow \infty} \frac{\sin^2(x)}{x^2 + 10}$

(c) (1.5 points) $\lim_{z \rightarrow -\infty} \frac{5z^4 + 20}{(z^2 - 4) \cdot (3z^2 + 1)}$

(d) (1.5 points) $\lim_{t \rightarrow 9} \frac{\sqrt{t}}{(t-9)^2}$

2. In this problem you will always be concerned with the function: $f(x) = x^2 + 1$.

(a) (2 points) Use the definition of the derivative (i.e. no short-cut derivative rules):

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

to find the value of $f'(3)$, i.e. the derivative of $f(x)$ when $a = 3$. Show your work – no work = no credit.

(b) (1 point) Find an equation for the tangent line that touches the curve $y = f(x)$ at $x = 3$.

(c) (1 point) Use the diagram provided below to sketch an accurate graph of the line that you found in Part (b). The curve shown is $y = f(x)$.

