

1.

(a) $\boxed{\text{DNE}}$, since $x + 2$ approaches -1 and $x + 3$ approaches 0^\pm (from both sides).

(b) $\boxed{-\infty}$, since $1 - x$ approaches -1 and $(x - 2)^2$ approaches 0^+ (from both the positive side).

(c) $\boxed{2}$, multiplying out the products, one gets $4x^2 + 4x + 1$ on the top and $2x^2 - 2x$ at the bottom; now the general theorem applies since $x \rightarrow -\infty$.

(d) $\boxed{0}$, multiply and divide by the conjugate $\sqrt{x+1} + \sqrt{x}$ and simplify.

2.

(a)

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

(b) Use the formula in (a) with $x = 1$ to find the limit defining $\boxed{f'(1) = 3}$.

(c) Use the point-slope formula to get an equation $y - 3 = f'(1)(x - 1)$, which simplifies to $\boxed{y = 3x}$.

(d) Use the formula in (a) to find the limit defining $\boxed{f'(x) = -1/x^2}$.