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1. a) $[-3, 0) \cup (0, 3]$

b) none

2. $f(x) = \dfrac{\sqrt{x}-1}{\sqrt{x}+1}$

$f(x) = \dfrac{x^{\frac{1}{2}}-1}{x^{\frac{1}{2}}+1}$

$f'(x) = \dfrac{\frac{1}{2}x^{-\frac{1}{2}}\cdot(x^{\frac{1}{2}}+1) - (x^{\frac{1}{2}}-1)(\frac{1}{2}x^{-\frac{1}{2}})}{(x^{\frac{1}{2}}+1)^2}$

$= \dfrac{\frac{1}{2} + \frac{1}{2}x^{-\frac{1}{2}} - \frac{1}{2} + \frac{1}{2}x^{-\frac{1}{2}}}{(x^{\frac{1}{2}}+1)^2}$

$= \dfrac{x^{-\frac{1}{2}}}{(x^{\frac{1}{2}}+1)^2}$

3. a) $f(x) = x + \frac{1}{x}$ at $a=1$

$f'(x) = 1 - \frac{1}{x^2}$

$= 1 - \frac{1}{(1)^2}$

$= 1 - 1$

$= 0$

$L(x) = f(a) + f'(a)(x-a)$

$= (1+\frac{1}{1}) + 0(x-1)$

$= 2 + 0$

$= 2$

b) $L(x) = f(a) + f'(a)(x-a)$

$= \left(1 + \frac{1}{0.9}\right) + 0(x-0.9)$

$= \left(1 + \frac{1}{0.9}\right)$

$= 2.12$

$f(0.9) \approx 2$