

Quiz 2Name: MEExplain your solution process clearly.
Write legible.1.(a) (4 points) Find the linearization of $f(x) = (\sqrt{x+3})^{-1}$ for $a = 1$.

$$f(x) = (x+3)^{-\frac{1}{2}} \Rightarrow f'(x) = -\frac{1}{2}(x+3)^{-\frac{3}{2}} \Rightarrow f'(1) = -\frac{1}{2}(4)^{-\frac{3}{2}} = -\frac{1}{2} \cdot \frac{1}{8} = -\frac{1}{16}$$

$$\downarrow$$

$$f(1) = \frac{1}{2},$$

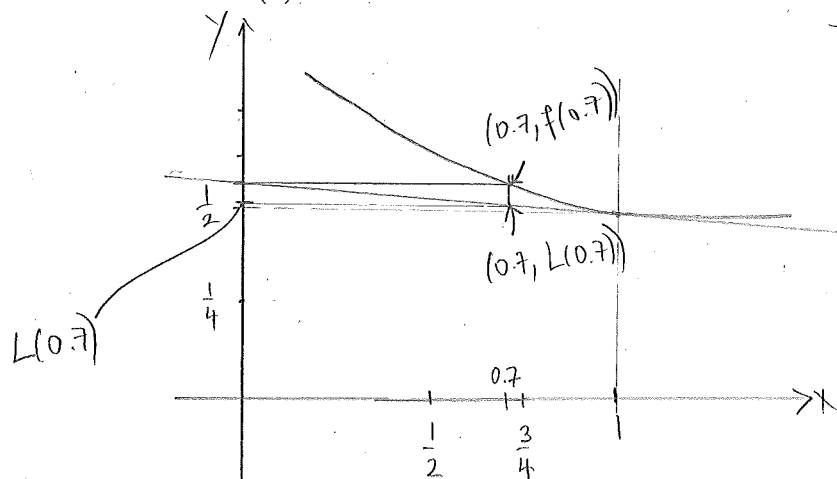
$$L(x) = f'(a)(x-a) + f(a) \Rightarrow L(x) = -\frac{1}{16}(x-1) + \frac{1}{2}$$

(b) (3 points) Use (a) to approximate $(\sqrt{3.7})^{-1}$. Give the final answer as one fraction.

$$(\sqrt{3.7})^{-1} = f(0.7) \approx L(0.7) = -\frac{1}{16}(0.7-1) + \frac{1}{2} = -\frac{1}{16} \cdot \frac{-3}{10} + \frac{1}{2}$$

$$\Rightarrow (\sqrt{3.7})^{-1} \approx \frac{3}{160} + \frac{80}{160} = \frac{83}{160}$$

$$\Rightarrow (\sqrt{3.7})^{-1} \text{ is approximately } \frac{83}{160}$$

(c) (3 points) Draw the graphs of f and its linearization to illustrate part (b). Is the approximation in (b) an overestimate or an underestimate?tangent line $y = L(x)$ lies below
the graph of f
 \downarrow
 The estimate
 in (b) is an
 underestimate.