

Name \_\_\_\_\_

- You have 20 minutes
- No calculators
- Show sufficient work

1. (2 points each) Evaluate the following limits.

(a)  $\lim_{x \rightarrow 0} \frac{\sqrt{25 + 16x^2} - 5}{2x^2}$

(b)  $\lim_{x \rightarrow 8^+} \frac{\ln x}{16 - 2x}$

2. (2 points) Evaluate  $\cos(2 \arctan(3))$ .

3. (2 points) Find all horizontal asymptotes on the graph of  $f(x) = \frac{8e^x + 25}{10 - 5e^x}$

4. (2 points) Prove rigorously that  $f(x) = x^3 + 3x^2 - 15$  has at least one positive root.