Instructions. Put the first and last name of everyone in your workgroup at the top of your paper. Everyone is to do their own worksheet but only one from each group is graded with the score shared. Be sure to show your work and explain your reasoning.

(1) Find the limit.

(a) \lim_{x \to 0} \frac{\sin 4x}{\tan 5x}

(b) \lim_{x \to 0} \frac{x}{1 - \cos x}

(c) \lim_{x \to 0} \frac{\cos x}{1 - \sin x}

(d) \lim_{x \to \infty} \frac{x^n}{e^x} \text{ (any } n)\n
(e) \lim_{x \to 0^+} \left( \frac{1}{x} - \frac{1}{e^x - 1} \right)

(f) \lim_{x \to 1^+} (\ln(x^7 - 1) - \ln(x^5 - 1))
(2) State Rolle’s Theorem. Be sure to include IF and THEN.

(3) State the Intermediate Value Theorem. Be sure to include IF and THEN.

(4) Use the Intermediate Value Theorem to show that \( x^5 + 4x = 1 \) has at least one solution.

(5) Use Rolle’s Theorem to show that \( x^5 + 4x = 1 \) cannot have two solutions. Therefore we may conclude that it has exactly one solution.

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g) \lim_{x \to 0^+} x^{\sqrt{x}}
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h) \lim_{x \to \infty} \left(1 + \frac{a}{x}\right)^{bx}
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