

Name \_\_\_\_\_ No Calculators. Present neatly. Score \_\_\_\_\_.

1. Find the transition points, intervals of increase/decrease, concavity, and asymptotic behavior. Then sketch the graph, with this information indicated.

$$y = x - 2 \ln x$$

2.

Sketch the graph of  $f(x) = 18(x-3)(x-1)^{\frac{2}{3}}$  using the formulas:

$$f'(x) = \frac{30(x - \frac{9}{5})}{(x-1)^{\frac{1}{3}}} \quad f''(x) = \frac{20(x - \frac{3}{4})}{(x-1)^{\frac{4}{3}}}$$

3. Briefly define each term/concept/theorem:

a) stationary point

b) inflection point

c) first derivative test

d) global maximum

e) Extreme Value Theorem

Your work:

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1. Find the transition points, intervals of increase/decrease, concavity, and asymptotic behavior. Then sketch the graph, with this information indicated.

$$y = x(4 - x) - 3 \ln x$$

2. Sketch the graph of  $f(x) = \frac{x}{x^2 + 1}$  using the formulas:

$$f'(x) = \frac{1 - x^2}{(1 + x^2)^2} \quad f''(x) = \frac{2x(x^2 - 3)}{(x^2 + 1)^3}$$

3. Briefly define each term/concept/theorem:

a) critical point

b) inflection point

c) second derivative test

d) relative minimum

e) Extreme Value Theorem

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Your work:

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