

PRACTICE EXAM 3 - MATH 112

DATE: Friday, March 19

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Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.
GOOD LUCK!!

1. Find the domain, the x - and y -intercepts, the intervals of monotonicity, the relative extrema, the intervals of concavity, the inflection points and then roughly sketch the graph of the function $f(x) = x^4 - 4x^3 + 5$.
2. Find the derivatives
 - (a) $f(x) = 4x^3e^{-x}$
 - (b) $f(x) = \frac{3^{2x-1}}{x-3}$
 - (c) $f(x) = xe^x - x^2e^{-x^2}$
3. Find the domain, the x - and y -intercepts, the intervals of monotonicity, the relative extrema, the intervals of concavity, the inflection points and then roughly sketch the graph of the function $f(x) = xe^{-x}$
4. Find the derivatives
 - (a) $f(x) = \ln \frac{x-2}{x-1}$
 - (b) $f(x) = \log_5 (x\sqrt{x^2 - 1})$
 - (c) $f(x) = \ln \frac{e^x + e^{-x}}{2}$
5. Find the domain, the x - and y -intercepts, the horizontal and vertical asymptotes, the intervals of monotonicity, the relative extrema, the intervals of concavity, the inflection points and then roughly sketch the graph of the function $f(x) = x - 2 \ln x$.
6. Compute the indefinite integrals
 - (a) $\int \frac{3}{\sqrt{x}} dx$
 - (b) $\int x(\sqrt{x} - \frac{2}{\sqrt{x}}) dx$
 - (c) $\int \frac{2x-1}{x^{2/3}} dx$