EXAM 4 - MATH 151

DATE: Friday, April 9
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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 asymptotes, create the study table and then roughly graph the function $f(x) = x - 2\ln x$.
2. Find the absolute max and the absolute min of $f(x) = \frac{3x}{\sqrt{4x^2+1}}$ in the interval $[-1, 1]$.
3. A rectangular container with two square sides and an open top is to have a volume of 12 cubic units. Find the dimensions of the container with the minimum surface area.
4. Verify that (**all**) the hypotheses of the Mean Value Theorem are satisfied by $f(x) = x + \frac{1}{x}$ on $[3, 4]$ and find all c in the interval that satisfy the conclusion of the Theorem.
   (a) $\int (x^{1/8} + x^{-3/5})dx$
   (b) $\int (\frac{x^4 - 7x^3 + 3x}{x^2} + 7e^{-x})dx$
   (c) $\int \frac{1}{1+\sin x}dx$ (Multiply both numerator and denominator by $1 - \sin x$!!)
5. Compute the indefinite integrals:
   (a) $\int \frac{x^2}{\sqrt{x^3+1}}dx$
   (b) $\int x^2 e^{-2x^3} dx$
   (c) $\int \cos 4x \sqrt{2 - \sin 4x}\ dx$

These formulas are offered courtesy of George® for your perusal:

1. $(\sin^{-1} x)' = \frac{1}{\sqrt{1-x^2}}, -1 < x < 1$
2. $(\cos^{-1} x)' = \frac{-1}{\sqrt{1-x^2}}, -1 < x < 1$
3. $(\tan^{-1} x)' = \frac{1}{1+x^2}, -\infty < x < \infty$
4. $(\sec^{-1} x)' = \frac{1}{|x|\sqrt{x^2-1}}, 1 < |x|$