Exam 2 Practice

MATH 170, CALC. LIFE SCIENCES, SPR 2016
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1. Find the absolute maximum and minimum of $f(x) = -x^3 + 3x^2 - 5$ on the interval $[1, 3]$.
2. Find the derivative of $f(x) = \sqrt{x}\ln(x^3)$.
3. Find the derivative of $f(x) = \cos(x)^{x+1}$.
4. Find the derivative of $f(x) = 5^x + \log_4 x$.
5. Find the derivative of $f(x) = \sqrt{e^x + \ln x}$.
6. Find the derivative of $f(x) = \log_{10}(\cos x)$.
7. Find the derivative of $f(x) = \dfrac{x^2 - x + 1}{x^2 + 3}$.
8. Find the derivative of $f(x) = \sqrt{x}\sin x$.
9. Consider the function $f(x) = xe^{-x}$, with $f'(x) = -e^{-x}(x-1)$, $f''(x) = e^{-x}(x-2)$.
   (a) Find the intervals on which f is increasing and decreasing.
   (b) Find the intervals on which f is concave up and concave down.
   (c) Determine any local max or minimums of f.
   (d) Determine any inflection points of f.
10. How do we know that $f(x) = x^5 - 4x + 1$ has a zero between 0 and 1?
11. How do we know that $f(x) = \dfrac{\sin(\pi x)}{e^x}$ has a critical point between 1 and 2?
12. How do we know that somewhere between 0 and 2, the function $f(x) = 2^x - 2x$ has a derivative equal to $\frac{1}{2}$?
13. Use linear approximation to approximate $\sqrt{15}$.
14. Find the linearization of $f(x) = \tan x$ at $x = \dfrac{\pi}{3}$.