Final Exam Practice Math 170, Calc. Life Sciences, Spr 2016

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1. Evaluate the following integrals:

   (a) $\int_1^2 \frac{(x+1)^2}{x}dx$

   (b) $\int_1^2 \frac{x}{(x+1)^2}dx$

   (c) $\int \frac{\sin(\ln x)}{x}dx$

   (d) $\int \frac{x^2+2}{x+2}dx$

   (e) $\int \ln(x^{1/3})dx$

   (f) $\int x\sec^2 xdx$

   (g) $\int_{-1}^1 x^{100}dx$

   (h) $\int_1^9 \sqrt{x}dx$

   (i) $\int_{\pi/6}^{\pi} \sin\theta d\theta$

   (j) $\int_1^4 (5-2t+3t^2)dt$

   (k) $\int_{-4}^4 e\,dx$

   (l) $\int e^{2x}\cos(5x)dx$

2. Find the derivative of $g(x) = \int_5^x (t-t^2)^8 dt$

3. Find the derivative of $h(x) = \int_{\pi}^x \sqrt{1+\sec t}dt$

4. Use liner approximation to approximate $\sqrt[3]{30}$

5. Evaluate $\lim\limits_{x\to 1} \frac{x^2-1}{x^2-x}$

6. Evaluate $\lim\limits_{x\to 0} \frac{e^{2x}-1}{\sin x}$

7. Evaluate $\lim\limits_{x\to 0^+} \frac{\ln x}{\sqrt{x}}$

8. Evaluate $\lim\limits_{x\to\infty} x\sin(\pi/x)$

9. Evaluate $\lim\limits_{x\to 0^+} (4x+1)^{\cot x}$

10. Evaluate $\lim\limits_{x\to 1}\left(\dfrac{x}{x-1} - \dfrac{1}{\ln x}\right)$

11. Verify that the function satisfies the hypotheses of Rolle's Theorem: $f(x) = 5 - 12x + 3x^2$ on $[1,3]$

12. Verify that the function satisfies the hypotheses of the Mean Value Theorem: $f(x) = \ln x$ on $[1,4]$

13. Find the critical values of $f(x) = 4 + \frac{1}{3}x - \frac{1}{2}x^2$

14. Find the absolute maximum and minimum values of $f(x) = 12 + 4x - x^2$ on $[0,5]$

15. Find the absolute maximum and minimum values of $f(x) = x + \dfrac{1}{x}$ on $[0.2, 4]$.

16. Find the absolute maximum and minimum values of $f(x) = 2\cos x + \sin x$ on $[0, \pi/2]$.

17. Find the linearization of $f(x) = \sin x$ at $a = \pi/6$