More Practice Problems for Computational Test — Math 1151

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Each of the following problems can be thought of as a single practice set, which consists of 8 problems just as in the actual test. The following is the generic instructions for the test.

> Compute the derivative of each of the following 8 functions. You do not need to simplify. You do not need to show steps. No calculator is allowed. **No partial credit will be given.** Be extremely careful with notation, signs, parentheses, etc. Please circle or box your final answer for each question. Finish them in **30 minutes**.

Problem 1. (Warm-up)

This is your warm-up set.

(a) $f(x) = x^4 e^{\sqrt{x}} + e^{\sqrt{3}} \cdot (\ln(x))^{\sqrt{4}}$

(b) $f(x) = x^3 - \pi^6 + 6^x$

(c) $f(x) = (7x+1)^{2x}$

(d) $f(x) = \dfrac{3x\cot(x)}{6x + \ln(x)}$

(e) $f(x) = \left(2x + \sin\left(\sqrt{x} + 5\right)\right)^5$

(f) $f(x) = \dfrac{\sec(8)}{\sqrt[5]{x}} + \dfrac{\sec(x)}{\sqrt[5]{8}} + \dfrac{e^6}{\sqrt[3]{6}}$

(g) $f(x) = \cos(x)\left(5x^4 + 2x\right)$

(h) $f(x) = \ln(4)\tan(2x+1) + \csc^5(2x+1)$

Problem 2. (Immersion)

Immerse yourself in the computation of the following derivatives.

(a) $f(x) = x^3 e^{\sqrt{x}} + e^{\sqrt{3}} \cdot (\ln(x))^{\sqrt{3}}$

(b) $f(x) = x^4 - \pi^4 + 5^x$

(c) $f(x) = (6x+1)^{4x}$

(d) $f(x) = \dfrac{2x\tan(x)}{6x + \ln(x)}$

(e) $f(x) = \left(2x + \cos(\sqrt{x} + 5)\right)^6$

(f) $f(x) = \dfrac{\cot(8)}{\sqrt[5]{x}} + \dfrac{\cot(x)}{\sqrt[5]{8}} + \dfrac{e^5}{\sqrt[3]{5}}$

(g) $f(x) = \sec(x)\left(5x^4 + 2x\right)$

(h) $f(x) = \ln(4)\sin(2x+1) + \csc^5(2x+1)$

Problem 3. (Dissemination)

Spend an evening showing your friends how to do these derivatives.

(a) $f(x) = x^5\cos(6) + 7^x + e^{21} + \dfrac{3}{x}$

(b) $f(x) = \left(2x^5 + 6x\right)\sec(x)$

(c) $f(x) = \dfrac{2x\ln(x^2-4)}{e^x + \pi x}$

(d) $f(x) = \sec\left(x^4 + \dfrac{4}{x^4}\right)$

(e) $f(x) = x^{e^x} + e^{x^e}$

(f) $f(x) = 2^\pi\ln(\sqrt{x}) + 2^{3x}\sqrt{\ln(x)} + 2^{\ln\sqrt{x}}$

(g) $f(x) = \csc(3x+9) - (3x+9)\cot^5(x)$

(h) $f(x) = \left(x + \ln(x^5-3)\right)^7$

Problem 4. (Solitude)

Now that you don't have any friends, you should have enough time to yourself to work out the following problems. Enjoy!

(a) $f(x) = (2x^6 + 5x) \cdot \sec(x)$

(b) $f(x) = \left(x + \ln(x^2 + 3)\right)^4$

(c) $f(x) = \tan\left(x^4 - \dfrac{6}{x^3}\right)$

(d) $f(x) = \dfrac{\ln(x) \cdot \sqrt[5]{x}}{e^x + 4x}$

(e) $f(x) = (4x + 5)^x$

(f) $f(x) = x^7 \cdot \sin(6) + 5^x + e^4 + \dfrac{3}{x}$

(g) $f(x) = \dfrac{\sin^4(x)}{\sqrt{x^3 + 2}}$

(h) $f(x) = \csc(5x - 1) - \cot^3(x) \cdot (5x - 1)$

Problem 5. (Defiance)

Who needs all those 30 minutes? Finish the following in 20 minutes.

(a) $f(x) = (4x + \sec(2))^{55}$

(b) $f(x) = x^6 + 6^x$

(c) $f(x) = \dfrac{3x^{10} + x^5}{x^3 + 3} \csc(x)$

(d) $f(x) = \ln(5\cot(5x^{\sqrt{3}} + 6))$

(e) $f(x) = e^{\sin(x)} \cos(4x)$

(f) $f(x) = \sqrt{\dfrac{4}{x^4} + 2x}$

(g) $f(x) = \cos(5x)e^{\sec(x)}$

(h) $f(x) = \left(\dfrac{7}{x^3}\right)^x + \dfrac{5}{\sqrt[3]{x}} + \dfrac{\sin(x)}{x}$

Problem 6. (Oblivion)

Now that you are an experienced *differentiator*, why not do another set?

(a) $f(x) = \cot^2(x) + \csc^2(2x)$

(b) $f(x) = \dfrac{e^{3x}\sqrt{x}}{\log_3(x)}$

(c) $f(x) = e^{5x}\sqrt{x} - \dfrac{5e^{-2x}}{x^6}$

(d) $f(x) = \dfrac{5x}{\left(\ln(x) + 4x^2\right)\left(x^2 - 3e^x\right)}$

(e) $f(x) = x^{\cot(x)} + \cot^3(x)$

(f) $f(x) = \pi^5 + 7x^6 + x^2 e^x$

(g) $f(x) = \sqrt[4]{3 + e + \csc(x)}$

(h) $f(x) = \tan(\sin(e^x))$

Problem 7. (Decrescendo)

At last, here comes your cool-down set.

(a) $f(x) = \dfrac{\cos(x)e^{3x}}{e^2}$

(b) $f(x) = e^{5x} + \dfrac{5\sqrt{x}}{x^6}$

(c) $f(x) = (x\sec(x) + 5)\left(x^3 - 2\right)$

(d) $f(x) = x5^{\pi} + \pi^5 + 5x^{\pi} + 5^x$

(e) $f(x) = \tan\left(\dfrac{x^{13} - 6x}{2 - 4x^3}\right)$

(f) $f(x) = \dfrac{\sec^4(x) + \tan(2)}{\sqrt{x^3+1} + 2}$

(g) $f(x) = \ln(x) \cdot \ln\left(\ln(x)\right)$

(h) $f(x) = \sqrt{\sqrt{1+5x} - \sqrt{1-5x}}$