Math 116 Practice Exam 1

Directions: WRITE YOUR NAME ON THIS TEST! Except where indicated, merely finding the answer to a problem is not enough to receive full credit; you must show how you arrived at that answer. Unless indicated, DO NOT convert irrational numbers such as $\sqrt{3}$ or π into decimal approximations; just leave them as they are.

1)

Find the first derivative for the following functions.

a) (2 points) $f(x) = \cos(x) \cdot e^x$

b) (2 points) $g(x) = \ln(\arctan(x))$, $x > 0$

c) (2 points) $h(x) = \ln(x^3 + 1) \cdot 16^{\sin(x)}$

2) (3 points) Solve the following non-calculus problem.

You are being given an investment opportunity. Eminem, having been paid for his Super Bowl advertising appearance in Chrysler stock, wishes to jettison some of his shares. He will give you $13,000 worth of stock, compounded continuously at a rate of 3%. Meanwhile, Mike Rowe will give you $9,000 worth of Ford stock just to spite Chrysler. If the Ford stock compounds continuously at 7%, which account will have more money in it after 10 years, and how much will it have (to the nearest penny)?

3) Evaluate the following indefinite integrals.

a) (5 points) $\int \dfrac{9x+1}{x^2 - 3x - 88}\, dx$

b) (3 points) $\int (7x^3 + 115x - 7) \cdot e^{4x}\, dx$

4) Compute the following limits.

a) (3 points) $\lim\limits_{x \to 1} \dfrac{x \ln(x) - x + 1}{(x-1)^2}$

b) (3 points) $\lim\limits_{x \to 0^+} (\arctan(7x) \cdot \cot(x))$

c) (4 points) $\lim\limits_{x \to \infty} \left(\dfrac{x+4}{x+7} \right)^x$

5) Evaluate the following definite integrals.

a) (4 points) $\displaystyle\int_0^{\pi/3} \cos^2(x)\tan^3(x)\ dx$

b) (5 points) $\displaystyle\int_{\pi/6}^{\pi/4} 8\ln(\cot(x))\sin(x)\cos(x)\ dx$