Math 1620 Calculus II Your Name:_____

Instructor: Jay Hurlburt

Exam1 (Sections 5.1- 5.6)

Total Score:
Competency Score:

Directions: Please show all your work neatly and clearly. You will not receive full credit unless you show all work.

Part I Competency Based Questions. Answer all questions. Each problem is worht 5 points.

1. Determine the derivative of each of the following functions. You need NOT simplify your answer

a. $y = \ln\left(\frac{2x(x+2)}{\sqrt{x^2-1}}\right)$

b. $y = \ln(\sin(5x))$

c. $y = x^2 e^{9x^2+5}$

d. $y = 7^{-2x}\tan x$

e. $y = \log_5(3x^2 + 2)$

f. $y = \arcsin(3x) + \arctan(\sqrt{x}\,)$

2. Evaluate the integral **analytically**. Answers for definite integrals must be left in exact form.

a. $\int \frac{1}{x(\ln x)^2}\,dx$

b. $\int_0^4 \frac{5}{3x+1}\,dx$

c. $\int_0^{\pi/3} \tan(2x)\ dx$

d. $\int \frac{e^{-1/x}}{x^2} dx$

e. $\int \frac{x^2}{x+1} dx$

f. $\int_{-1}^{2} 4^{x/2} dx$

Part II Non-Competency Based questions. Answer any 4. Each problem is worth 10 points

1. Use *logarithmic differentiation* to determine $\frac{dy}{dx}$ given that $y = x^{2x-1}$

2. Answer the following:

a. Evaluate:(your answer must be in **radians** and in **exact** form)

$\arctan\left(\frac{\sqrt{3}}{3}\right)$

b. Write the expression in algebraic form: $\tan\left(\text{arcsec}\,\frac{x}{3}\right)$

3. Use Theorem 5.9 (The Derivative of an Inverse Function Theorem) to determine $(f^{-1})'(6)$ for the function $f(x) = x^3 - \frac{4}{x}$. (**Hint:** $f(2) = 6$)

4. Evaluate the area of the region bounded by the graphs of $y = \sec x,\ x = 0,$ $x = \frac{\pi}{3}$ and $y = 0.$ As always, leave your answer in exact form only.

5. Determine the equation of the tangent line to $y = x\ln x - x$ at the point $(2, -2 + \ln 4).$ Once again, be sure to use only exact values.

IMPORTANT! In Part II, you needed to answer any 4 questions. If you attempted all 5, please state which one you want omitted. If not, I will grade sequentially.

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