Practice for Exam I MATH 2254 (Ritter)

Sections Covered: 6.1, 6.2*, 6.3*, 6.4*, 6.6, 6.8

This practice exam is intended to give you a rough idea of the types of problems you can expect to encounter. **Nothing else is intended or implied.**

(1) Find the derivative of each function.

(a) $y = \ln(4x^2 + \cos x)$

(b) $y = e^{\sin^{-1} x^2}$

(c) $y = \tan^{-1}(\sqrt{t})$

(d) $y = x^2 \log_4(x)$

(e) $y = x^{\cos x}$

(2) Evaluate each integral.

(a) $\displaystyle \int_0^1 x e^{x^2}\, dx$

(b) $\displaystyle \int \frac{1}{x^2 + 4}\, dx$

(c) $\displaystyle \int_2^4 \frac{1}{x \ln x}\, dx$

(d) $\displaystyle \int 4^{\tan x} \sec^2 x\, dx$

(e) $\displaystyle \int \frac{dy}{\sqrt{9 - y^2}}$

(f) $\displaystyle \int \frac{\sin^{-1} x}{\sqrt{1 - x^2}}\, dx$

(3) Given $f(x) = x^2 - 4x - 5$ for $x \geq 2$. Find $\left(f^{-1}\right)'(0)$. Note: do not find f^{-1}.

(4) Find f^{-1} and show that $(f^{-1} \circ f)(x) = x$ where $f(x) = 5 - 4x$.

(5) Find the equation of the line tangent to the graph of $y = \tan^{-1} x^2$ at $x = -1$.

(6) Find $\frac{dy}{dx}$ given

$$xy = e^y \ln(x)$$

(7) Evaluate the limits. (If applying l'Hospital's rule, clearly state this.)

(a) $\displaystyle\lim_{x \to 0} \frac{x^2}{1 - \cos(x)}$

(b) $\displaystyle\lim_{t \to 0} \frac{3^t - 5^t}{t}$

(c) $\displaystyle\lim_{x \to \infty} \frac{\ln x}{x}$

(d) $\displaystyle\lim_{x \to 1} \frac{x - 1}{e^{x-1}}$

(e) $\displaystyle\lim_{x \to 0} \tan^{-1}\left(-\frac{1}{x^2}\right)$