Math 1301 Practice Exam 1

75 minutes

Name: _____

Section/Instructor: _____

Instructions.

- Show all relevant work for full credit.
- You can use one page of hand-written notes
- You are not allowed to use a calculator
- Clearly box your final answers like this: $\boxed{\text{answer}}$.

---

1. True or False (justify your response) [**10** pts]

(a) $2\ln(x) = \ln(x^2)$ for all real values of x.

(b) The function $f(x) = x^3 + 1$ has an inverse for all real values of x.

(c) If $f(x) = e^x$ and $g(x) = \ln(x)$, then $f(g(x)) = x$ for all real values x.

(d) If f is one to one, then it is strictly increasing.

2. Calculate the following limits [**15** pts]

(a) $\lim_{x\to 0^+}\left(\frac{1}{\ln(x)}-\frac{1}{x-1}\right)$

(b) $\lim_{x\to 0^+}(\sin(x))^{\tan(x)}$

3. Find the derivatives for the following functions [**30** pts]

(a) $f(x)=(\sin(x))^x$

(b) $g(x) = \tan^{-1}(\ln(\sin(2^x)))$

(c) $h(x) = e^{x\cos(x)}$

(d) $p(x) = 2^{\arcsin(\ln(x))}$

4. Evaluate the following integrals [**30** pts]

(a)

$$\int \frac{4^x}{2^x + 1} dx$$

(b)

$$\int \frac{1 + \ln(x)}{x + x \ln^2(x)} dx$$

(c)

$$\int \frac{5^x}{25^x + 2} dx$$

(d)

$$\int \frac{x \ln(x^2 + 1)}{x^2 + 1} dx$$

(e)

$$\int \frac{3^x}{7^x + 3^x} dx$$

(f)

$$\int \frac{dx}{\sqrt{9 - (3x + 1)^2}}$$

5. Let $f(x) = x^2 + \ln(x)$. Find $(f^{-1})'(1)$. [**5** pts]

6. Find the following exact value of the following

(a)

$$\sin^{-1}\left(\frac{\sqrt{3}}{2}\right) + \arccos\left(-\frac{1}{2}\right)$$

(b)

$$\arcsin\left(\cos\left(\frac{5\pi}{6}\right)\right)$$

7. Find the domain of the following functions

(a)

$$f(x) = \arcsin\left(\frac{1}{\arccos(x)}\right)$$

(b)

$$g(x) = \ln\left(\frac{x^2 - 4}{x - 1}\right)$$

(c)

$$h(x) = \frac{\ln(1 - \arcsin(x))}{2x - 1}$$

End of Exam. Check your work!