MATH 220 Test 2 Spring 2016

Name ____________________________ NetID ____________________________

- Sit in your assigned seat (circled below).
- Circle your TA discussion section.
- Do not open this test booklet until I say \textit{START}.
- Turn off all electronic devices and put away all items except a pen/pencil and an eraser.
- Remove hats and sunglasses.
- You must show sufficient work to justify each answer.
- While the test is in progress, we will not answer questions concerning the test material.
- Do not leave early unless you are at the end of a row.
- Quickly turn in your test to me or a TA and show your Student ID.

\begin{itemize}
\item AD1, TR 9:00-10:50, Hannah Burson
\item AD2, TR 1:00-2:50, Cassie Christenson
\item ADA, TR 8:00-8:50, Ifitkhar Ahmed
\item ADB, TR 9:00-9:50, Ifitkhar Ahmed
\item ADC, TR 10:00-10:50, Elizabeth ‘Liz’ Tatum
\item ADD, TR 11:00-11:50, Elizabeth ‘Liz’ Tatum
\item ADE, TR 12:00-12:50, Emily Heath
\item ADF, TR 1:00-1:50, Emily Heath
\item ADG, TR 2:00-2:50, Dara Zirlin
\end{itemize}

FRONT OF ROOM – 141 Wohlers Hall
1. (10 points) Find \( f'(x) \) given that \( f(x) = \sec(\ln(\cot(x))) \)

2. (10 points) Find \( w'(t) \) given that \( w(t) = t^{42} \arctan(t^{25}) \)
3. (10 points) Find $g'(x)$ given that $g(x) = \cos^4(e^{9x})$

4. (10 points) Find $\frac{dy}{dx}$ given that $x^8 \sin(y^5) = 9x^7 + 4y^3$
5. (10 points) Evaluate the limit. You must fully justify your answer.

\[
\lim_{x \to 0} \frac{\cos (20x) - 1}{e^{5x} - 5x - 1}
\]

6. (10 points) Find the \((x, y)\) coordinates for each inflection point on the graph of the function.

\[f(x) = 3x^5 - 50x^4 + 250x^3 - 314x + 42\]
7. (10 points) Find the absolute maximum $y$-value of the given function. Simplify your answer.

\[ y = \frac{e^x}{e^{6x} + 15} \]

8. (10 points) Let \( f(x) = \arctan(25x) - \arctan(x) \). Determine each interval where \( f \) is increasing and each interval where \( f \) is decreasing.
9. (10 points) Find the $x$-coordinate for the point on the graph of $y = 3x + 2$ which is closest to the point $(4, 0)$. 
10. (10 points) Assume that oil spilled from a ruptured tanker spreads in a circular pattern whose radius increases at a constant rate of 12 feet per second. How quickly is the area of the spill increasing when the radius of the spill is 100 feet?
1. (10 points) ____________________
2. (10 points) ____________________
3. (10 points) ____________________
4. (10 points) ____________________
5. (10 points) ____________________
6. (10 points) ____________________
7. (10 points) ____________________
8. (10 points) ____________________
9. (10 points) ____________________
10. (10 points) ____________________

TOTAL (100 points) ________________