Practice Exam 1

No calculators. Show your work. Clearly mark each answer.

1. State the domain and the range of the function \( \sqrt{1-x^2} \). Is this function one-to-one? Sketch the graph.

2. For which value of \( a \) is the following function continuous?

\[
f(x) = \begin{cases} 
x^2 + a, & x > 0 \\
5x - 3, & x \leq 0.
\end{cases}
\]

3. Find the following limits if they exist.

(a) \[
\lim_{x \to 1^+} \frac{3x - 2}{x^2 - 1}
\]

(b) \[
\lim_{x \to 0} \frac{\sqrt{x + 1} - 1}{x}
\]

(c) \[
\lim_{x \to 0} \frac{\sin (2x)}{\sin (x)}
\]

(d) \[
\lim_{x \to \infty} \frac{\sqrt{x^4 + x + 1} - x^2}{x^2}
\]

4. Find the vertical asymptotes of the function \( e^{-\frac{1}{x}} \).

5. Find the equation of the line passing through the points \((-2, -3)\) and \((1, 1)\).

6. Suppose a stone is thrown vertically upward from a height of 4 feet. The height \( s \) in feet of the stone above the ground \( t \) seconds after it is thrown is

\[
s(t) = -16t^2 + 32t + 4.
\]

(a) What is average velocity of the stone after 1 second?
(b) What is average velocity of the stone after \( t \) seconds?
(c) What is initial velocity of the stone?
(d) When does the stone strike the ground?