1. 10 pts. Find the inverse of \( f(x) = \sqrt{x+3} \), for \( x \geq -3 \).

2. 10 pts. Find \((f^{-1})'(3)\) if \( f(x) = x^3 + x + 1 \).

3. 10 pts. Find
\[
\frac{d}{dx} (\ln |x^2 - 1|),
\]
and give the intervals on which the result is valid.

4. 10 pts. Find \( f'(\pi/4) \) for \( f(x) = e^{\sin 2x} \).

5. 10 pts. each Evaluate each integral
(a) \( \int e^{\sqrt{x}} \frac{\sqrt{x}}{x} \, dx \)
(b) \( \int_{-1}^{1} 10^x \, dx \)
(c) \( \int \frac{5}{\sqrt{49 - x^2}} \, dx \)

6. 10 pts. Find the derivative using logarithmic differentiation:
\[
f(x) = (\cos x)^{\tan x}
\]

7. 10 pts. each Find each derivative.
(a) \( y = 4^{-x} \sin x \)
(b) \( y = \ln(x^3 + 1)^x \)
(c) \( y = 4\log_3(x^2 - 1) \)
(d) \( f(z) = \tan^{-1}(2z^2 - 4) \)

8. 10 pts. Evaluate using L'Hôpital's Rule:
\[
\lim_{x \to 0^+} x^{20x}.
\]

9. 10 pts. each Evaluate each integral.
(a) \( \int x^2 e^{4x} \, dx \)
(b) \( \int_{0}^{\pi/2} x \cos 2x \, dx \)