Name: _____ Date: _____

AP Calculus AB Homework Ms. Loughran

For 1 and 2, find $\frac{dy}{dx}$.

1. $y = x^5 \sec\left(\frac{1}{x}\right)$

2. $y = \cos(\cos x)$

3. Find an equation for the tangent line to $y = x\cos 3x$ at $x = \pi$.

4. If $y = \cot^3(\pi - \theta)$, find $\frac{dy}{d\theta}$.

5. Let

$$f(x) = \begin{cases} x^2, & x \le 1 \\ \sqrt{x}, & x > 1 \end{cases}$$

Determine whether *f* is differentiable at $x = 1$. If so, find the value of the derivative there.

6. Let

$$f(x) = \begin{cases} 3x^2, & x \le 1 \\ ax + b, & x > 1 \end{cases}$$

Find the values of *a* and *b* so that *f* will be differentiable at $x = 1$.

7. $\frac{d^{87}}{dx^{87}}[\sin x]$

8. $\frac{d^{100}}{dx^{100}}[\cos x]$

9. In each part, determine where *f* is differentiable.

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

(b) $f(x) = \cos x$

(c) $f(x) = \tan x$

(d) $f(x) = \cot x$

(e) $f(x) = \sec x$

(f) $y = \csc x$

(g) $f(x) = \frac{1}{1 + \cos x}$

(h) $f(x) = \frac{1}{\sin x \cos x}$

(i) $f(x) = \frac{\cos x}{2 - \sin x}$

p. 115 #s 40, 41, 44, 45