Principles of Calculus Modeling: An Interactive Approach by Donald Kreider, Dwight Lahr, and Susan Diesel
Exercises for Section 2.9

1. (1 pt)
Find the derivative of the trigonometric function $y = \cos(7\sqrt{x})$.
$y' =$ _____

2. (1 pt)
Find the derivative of $y = \cos(2\sin x)$.
$y' =$ _____

3. (1 pt)
Find the derivative of $y = 8\csc\left(\frac{10}{x}\right)$.
$y' =$ ___
A. $-8\csc\left(\frac{10}{x}\right)\cot\left(\frac{10}{x}\right)$
B. $\frac{80}{x^2}\csc\left(\frac{10}{x}\right)\cot\left(\frac{10}{x}\right)$
C. $\frac{80}{x^2}\csc x\cot x$
D. $-8\csc\left(\frac{80}{x^2}\right)\cot\left(\frac{80}{x^2}\right)$
E. None of these.

4. (1 pt)
Find the derivative of $y = \tan(-7x)\cot(-7x)$. Simplify your answer **completely**. Use either $\frac{1}{\tan x}$ or $\frac{\cos x}{\sin x}$ to express $\cot x$ and $\frac{1}{\sin x}$ to express $\csc x$.
$y' =$ _____

5. (1 pt)
What is the derivative of $f(t) = 10t\cos t - 10\sin t$?
$f'(t) =$ _____

6. (1 pt)
Find the derivative of $g(t) = \sqrt{\frac{3\cos t}{t}}$.
$g'(t) =$ _____

7. (1 pt)
Find the derivative of $f(t) = \cos(\tan(\sin t))$.
$f'(t) =$ _____

8. (1 pt)
Find equations for lines that are tangent and normal to the curve $y = \cos\left(7x + \frac{\pi}{2}\right)$ at the point (0,0).
Line tangent to curve:
$y =$ _____
Line normal to curve:
$y =$ _____

9. (1 pt)
Let $y = \sin(2x^2)$. Find each of the following.
$y' =$ _____
$y'' =$ _____
$y''' =$ _____

10. (1 pt)
Let $y = \tan(-9x)$. Find each of the following.
$y' =$ _____
$y'' =$ _____
Express y'' in terms of y.
$y'' =$ _____

11. (1 pt)
Let $f(x) = \sec(x)$ and $g(x) = f'(x)$. What is $g'(x)$?
$g'(x) =$ _____

12. (1 pt)
Sisyphus, the great ruler of Corinth known for his trickery and deceit, was captured and punished in Tartalus. When captured, his punishment was to roll a heavy stone to the top of a hill. Upon reaching the top, the stone would invariably slip down the other side, forcing Sisyphus to begin anew. If the height of the stone at time t can be described by the function $f(t) = 19(\sin(t))^2$ cubits, what function describes the rate of change in the height of the stone?
_____ cubits / second

13. (1 pt)
Find the derivative of $19\cos(\cos(6x))$ at $x = \frac{\pi}{2}$.
_____

14. (1 pt)
Find the derivative of $\sqrt{\cos^2(5x) + \sin^2(5x)}$.
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