

Complete the following differentiation problems. Each answer corresponds to a letter in the list on the back. Mark that letter in the box to the left of the problem.

1. _____ If $u = 25x$, determine $\left. \frac{du}{dx} \right|_{x=1}$.
2. _____ If $y = \frac{8}{3} \left(\sqrt[4]{t^3} \right)$, determine $\left. \frac{dy}{dt} \right|_{t=16}$.
3. _____ If $f(t) = -2(t^4 - 1)$, determine $f'(-1)$.
4. _____ If $f(x) = 3x \sin(x)$, determine $f'(\pi/2)$.
5. _____ If $y = \frac{2x + 1}{6 - x}$, determine $y'(-1)$.
6. _____ If $y = \sec(x)$, determine $\left. \frac{dy}{dx} \right|_{x=\pi/4}$.
7. _____ Let $f(x) = \sin(x)$. Find all values a such that the tangent line to the graph of $y = f(x)$ at $(a, f(a))$ is parallel to the line $y = x$. Then, find one of those choices in the answers below, and match it to a letter on the back.

$-\pi/2$ 0 $2\pi/3$ π
8. Suppose you are on another planet, and an object is thrown into the air. The object's height in meters is given by $s(t) = -t^2 + 2t + 3$, where t is in seconds.
 - (a) _____ What is $v(0)$?
 - (b) _____ The object is initially moving _____.
 - (c) _____ What is $a(10)$?
 - (d) _____ What is the maximum height of the object?
9. _____ Where does the normal line to the parabola $y = x - x^2$ at the point $(1, 0)$ intersect the parabola a second time? Answer: at $(a, f(a))$ where $a = ?$
10. _____ If $f(x) = \frac{\sqrt{x}}{\sin(x)}$, what is $f'(\pi/2)$?
11. _____ If $f(t) = (t^5 + 20t + 12)(t^3 - 131t^2 + 12t - 11)$, what is $f'(0)$?
12. _____ If $y = \frac{1 - \sqrt{t}}{1 + t}$, what is $\left. \frac{dy}{dt} \right|_{t=1}$?

Answer	Letter
1	O
2	F
3	A
4	T
$\frac{1}{\sqrt{2\pi}}$	A
$\sqrt{2}$	G
-76	L
8	D
down	E
up	O
25	G
$-\frac{1}{4}$	L
-1	B
$\frac{13}{49}$	W
-2	O
0	S