

1:		5:		9:					
2:		6:		10:					
3:		7:							
4:		8:							

Problem 1

Let f be a differentiable function such that $f(3) = 15$, $f(6) = 3$, $f'(3) = -8$, and $f'(6) = -2$. The function g is differentiable and $g(x) = f^{-1}(x)$ for all x . What is the value of $g'(3)$?

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- A. $-\frac{1}{2}$
- B. $-\frac{1}{8}$
- C. $\frac{1}{6}$
- D. $\frac{1}{3}$
- E. Cannot be determined.

Problem 2

The slope of the tangent to $y = \arctan(4x)$ at $x = \frac{1}{4}$ is:

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- A. 2
- B. $\frac{1}{2}$
- C. 0
- D. $-\frac{1}{2}$
- E. -2

Problem 3

If $f'(x) = (x - 1)(x + 2)(3 - x)$, which of the following is NOT true about $f(x)$?

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- A. $f(x)$ has a horizontal tangent at $x = 1$
- B. $f(x)$ is a polynomial of degree 4
- C. $f(x)$ has a relative maximum at $x = 3$
- D. $f(x)$ is decreasing on $(-2, 1)$
- E. $f(x)$ is concave up on $(-2, 1)$

Problem 4

At the point of intersection of $y = \sin(x + \frac{\pi}{2})$ and $y = 1 - \frac{x^2}{2}$, the tangent lines are:

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- A. identical
- B. parallel
- C. perpendicular
- D. intersecting but not perpendicular
- E. none of the above

Problem 5

The graph of an even function passing through $(3, -2)$ must also contain:

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- A. $(-3, -2)$
- B. $(-3, 2)$
- C. $(3, 2)$
- D. $(2, 3)$
- E. $(0, 0)$

Problem 6

$$\lim_{x \rightarrow 0} \frac{\cos\left(\frac{\pi}{2} + x\right) - \cos\left(\frac{\pi}{2} - x\right)}{x} =$$

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- A. 1
- B. -2
- C. -1
- D. 0
- E. 2

Problem 7

$$\int 5^{2x} dx =$$

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- A. $\frac{5^{2x}}{\ln 5} + C$
- B. $\frac{5^{2x}}{2 \ln 5} + C$
- C. $\frac{5^{2x+1}}{2x+1} + C$
- D. $\frac{5^{2x}}{2} + C$
- E. $(\ln 5)5^{2x} + C$

Problem 8

$$f(x) = \frac{25 - x^2}{5 - x} \text{ for } x \neq 5$$

and $f(x) = 5$ when $x = 5$

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Which of the following is correct?

- A. $f(x)$ is continuous at 5 since $f(x)$ is defined at $x = 5$
- B. $f(x)$ is continuous at 5 since $\lim_{x \rightarrow 5} f(x)$ exists
- C. $f(x)$ is discontinuous at 5 since $f(5)$ does not exist
- D. $f(x)$ is discontinuous at 5 since $\lim_{x \rightarrow 5} f(x)$ DNE
- E. $f(x)$ is discontinuous at 5 since $\lim_{x \rightarrow 5} f(x) \neq f(5)$

Problem 9

If $y = \ln(2x + 3)$, then $\frac{d^2y}{dx^2} =$

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- A. $\frac{2}{2x + 3}$
- B. $\frac{2}{(2x + 3)^2}$
- C. $\frac{4}{(2x + 3)^2}$
- D. $\frac{-4}{(2x + 3)^2}$
- E. $\frac{-2}{(2x + 3)^2}$

Problem 10

$$\lim_{h \rightarrow 0} \frac{5^{2+h} - 25}{h} =$$

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- A. 0
- B. 1
- C. 25
- D. $25 \ln 5$
- E. $25e^5$

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ANSWER KEY

1 (256)	A	5 (41)	A	9 (45)	D				
2 (254)	A	6 (42)	B	10 (46)	D				
3 (39)	E	7 (43)	B						
4 (40)	A	8 (44)	E						

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