

105 Test 3 PRACTICE

1. Solve the equation $2^{6-3x} = 8$.
a. 1 b. -1 c. 2 d. 1 e. 0
2. Use implicit differentiation to find the slope of the curve $2xy^2 - 3y = 2$ at the point (1, 2).
a. $-\frac{8}{5}$ b. $-\frac{8}{3}$ c. $-\frac{3}{8}$ d. $\frac{5}{8}$ e. $-\frac{5}{8}$
3. Let $x(t)$ and $y(t)$ be functions of t related by the equation $x^3 + y^3 = 2$.
When $x=1, y=1$ and $\frac{dx}{dt} = 2$ what is $\frac{dy}{dt}$?
a. -2 b. -1 c. 0 d. 1 e. 2
4. Find the derivative of $f(x) = \frac{e^x - 1}{e^x + 1}$ at $x = 0$.
a. $\frac{1}{2}$ b. $\frac{1}{4}$ c. 2 d. -4 e. $-\frac{1}{2}$
5. If $y = \frac{1}{2} u^2 + 2 u^{\frac{1}{2}}$ and $u = 1 - 2x$ use the chain rule to compute $\frac{dy}{dx}$.
a. $-2 \left\{ (1 - 2x) + \frac{1}{\sqrt{1 - 2x}} \right\}$ b. $-2 \left\{ (1 - 2x) - \frac{2}{\sqrt{1 - 2x}} \right\}$
c. $-2 (1 - 2x) + \frac{1}{\sqrt{1 - 2x}}$ d. $-\frac{1}{2} (1 - 2x) + \frac{2}{\sqrt{1 - 2x}}$
e. $(1 - 2x) + \sqrt{1 - 2x}$
6. Find the equation of the tangent line to the curve $y = e^x$ at the point (1, e).
a. $y = ex$ b. $ey + x = 0$ c. $y = e(x - 1)$ d. $y = ex + 1$
e. $ey = x + 1$
7. Find the derivative of $f(x) = 3x e^{x^2}$.
a. $(6x^2 + 3) e^{x^2}$ b. $(3x^2 + 6) e^{x^2}$ c. $(3 + 2x + 6x^2) e^{x^2}$
d. $(x^2 + 2x + 6) e^{x^2}$ e. $(3x^2 - 2) e^{x^2}$

8. If y is a function of x satisfying $y' - 2y = 0$ and derivative $y'(0) = 3$ then find y .

a. $y = \frac{3}{2} e^{2x}$ b. $y = \frac{3}{2} e^{-2x}$ c. $y = \frac{2}{3} e^{-2x}$ d. $y = \frac{2}{3} e^{2x}$ e. $y = \frac{1}{2} e^{2x}$

9. Solve the equation $\ln(\ln 3x) = 0$.

a. $\frac{e}{3}$ b. e^3 c. e^{-3} d. $-\frac{e}{3}$ e. $\frac{1}{3}$

10. Solve the equation $\ln(x^2 + 2x + 2) = 0$.

a. -1 b. -2 c. 0 d. 2 e. 1

11. Find the derivative of $f(x) = \ln((x+1)^{100})$.

a. $\frac{100}{x+1}$ b. $\frac{99}{x+1}$ c. $100(x+1)$ d. $99(x+1)$ e. $100 \ln(x+1)^{99}$

12. The function $f(x) = \frac{\ln x}{x}$, defined for $x > 0$, has one relative extreme point. Find the x -ordinate of this point.

a. e b. $\frac{1}{e}$ c. $e - 1$ d. $\frac{1}{e-1}$ e. $\ln 2$

13. Find the derivative of $f(x) = \ln\left(\frac{x}{x-3}\right)$.

a. $\frac{1}{x} - \frac{1}{x-3}$ b. $\frac{1}{x-3} - \frac{1}{x}$ c. $\frac{-3}{(x-3)^2}$ d. $\frac{x-3}{x}$ e. $\frac{1}{(x-3)^2}$

14. Find the derivative of $f(x) = \ln(x^3(x+1)^4)$.

a. $\frac{3}{x} + \frac{4}{x+1}$ b. $\frac{3}{x} + \frac{12}{x+1}$ c. $\frac{1}{x^3} + \frac{1}{(x+1)^4}$
d. $3x + 4(x+1)$ e. $x^3 + (x+1)^4$.

15. Find the derivative of the composite function $f \circ g(x)$ where

$f(x) = \frac{x^5}{5} + \frac{x^3}{3}$ and $g(x) = \sqrt{x}$.

a. $\frac{x^2 + x}{2\sqrt{x}}$ b. $\frac{x^4 + x^2}{2\sqrt{x}}$ c. $\frac{5x^4 + 3x^2}{2\sqrt{x}}$ d. $\frac{x^4 + x}{2\sqrt{x}}$ e. $\frac{x^2 + 2x}{2\sqrt{x}}$

16. A population of bacteria is given by $P(t) = 10 e^{kt}$ where t denotes time measured in seconds and k is some constant. If after 10 seconds the population is 30 cells find the value of k .

- a. $\frac{\ln 3}{10}$ b. $\frac{10}{\ln 3}$ c. $\frac{\ln 10}{3}$ d. $\ln \frac{3}{10}$ e. $\ln 3$

17. If $P(t) = 500 e^{\frac{t}{100}}$ find for what t the value of P is 1000.

- a. $100 \ln 2$ b. $2 \ln 100$ c. $\ln 200$ d. 200 e. $5 \ln 2$

18. The growth rate of a certain cell culture is proportional to its size. In 6 hours the cell population grows from one million to two million. How large will the cell population be after one day?

- a. 16 million b. 12 million c. 8 million
d. 6 million e. 4 million

19. The half life of Strontium-90 is 30 years. How long will it take for a given quantity to diminish to one tenth of its present amount?

- a. $30 \frac{\ln 10}{\ln 2}$ b. $30 \ln 5$ c. $10 \frac{\ln 30}{\ln 2}$
d. $\frac{\ln 10}{\ln 2}$ e. $\frac{\ln 10}{\ln 2} \ln 30$

20. If interest is compounded continuously at a rate of 10% how many years will it take for an investment of \$1000 to double?

- a. $10 \ln 2$ b. $2 \ln 10$ c. $\ln 2 \ln 10$ d. 2^5 e. 10