



選擇題共 20 題，每題 5 分

1. A rectangle has perimeter 18 m. Express the area of the rectangle as a function $A(l)$ of the length l of one of its sides.

- (a) $A(l) = 18l + l^2$
- (b) $A(l) = 18l - l^2$
- (c) $A(l) = 9l + l^2$
- (d) $A(l) = 9l - l^2$

2. Find a number δ such that $|\sqrt{4x+1} - 3| < 0.4$ where $|x - 2| < \delta$. Please give the answer correct to two decimal places, rounding down if necessary.

- (a) 0.56
- (b) 0.71
- (c) 0.64
- (d) 0.79

3. Determine the values of x for which the linear approximation $\frac{1}{(1+3x)^3} \approx 1 - 9x$ is accurate to within 0.15.

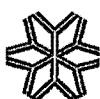
- (a) $-0.65 < x < 0.66$
- (b) $-1.03 < x < 0.24$
- (c) $-0.57 < x < 0.68$
- (d) $-0.04 < x < 0.06$

4. Two cars start moving from the same point. One travels south at 28 mi/h and the other travels west at 50 mi/h. At what rate is the distance between the cars increasing 4 hours later? Round the result to the nearest hundredth.

- (a) 57.31 mi/h
- (b) 55.31 mi/h
- (c) 58.32 mi/h
- (d) 57.34 mi/h

5. Use implicit differentiation to find an equation of the tangent line to the curve $y^2 = x^3(10 - x^2)$ at the point (1, 3).

- (a) $y = 3.33x$
- (b) $y = 4.33x - 1.33$
- (c) $y = 5.33x - 2.33$
- (d) $y = 6.33x - 3.33$



6. Use Newton's method to approximate the root of $x^4 + x - 3 = 0$ in the interval [1, 2], correct to six decimal places. Use $x_1 = 1.5$ as the initial approximation.

- (a) $x = 1.164036$
- (b) $x = 1.164032$
- (c) $x = 1.164033$
- (d) $x = 1.164035$

7. For the given cost and demand functions, find the production level that will maximize profit.

$$C(x) = 680 + 11x + 0.04x^2, \quad p(x) = 16 - \frac{x}{100}$$

- (a) $x = 66$
- (b) $x = 50$
- (c) $x = 42$
- (d) $x = 54$

8. Find the value of the limit $\lim_{x \rightarrow \infty} \frac{x^7}{7^x}$.

- (a) 7
- (b) ∞
- (c) 0
- (d) 1

9. If $h(x) = x + \sqrt{x}$, find $h^{-1}(12)$.

- (a) 9
- (b) 8
- (c) 6
- (d) 11

10. For a function $y = \sin(2 \cdot \ln x)$, find the equation of the tangent line to the curve at the given point (1, 0).

- (a) $y = -x + 1$
- (b) $y = x - 1$
- (c) $y = 2x - 2$
- (d) $y = x$



11. A particle move along a line. Its velocity (m/sec.) at time t is $v(t) = t^2 - t - 6$. Find the distance (m) traveled during the time period $1 \leq t \leq 4$

- (a) $9/2$
- (b) $-9/2$
- (c) $61/6$
- (d) $-61/6$

12. Find the area enclosed by the line $y = x - 1$ and the parabola $y^2 = 2x + 6$

- (a) 16
- (b) 18
- (c) 20
- (d) None of the above

13. Evaluate the integral $\int_1^2 \frac{\ln x}{x^2} dx$

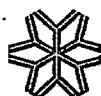
- (a) $0.5 - 0.5 \ln 2$
- (b) $0.5 \ln 2 - 0.5$
- (c) $0.5 + 0.5 \ln 2$
- (d) $-0.5 \ln 2 - 0.5$

14. Find $\int \frac{1}{x^2-9} dx$

- (a) $6 \ln \left| \frac{x-3}{x+3} \right| + C$
- (b) $\frac{1}{6} \ln \left| \frac{x-3}{x+3} \right| + C$
- (c) $6 \ln \left| \frac{x+3}{x-3} \right| + C$
- (d) $\frac{1}{6} \ln \left| \frac{x+3}{x-3} \right| + C$

15. Evaluate $\int_1^\infty \frac{1}{(3x+1)^2} dx$

- (a) $1/16$
- (b) $-1/16$
- (c) $1/12$
- (d) $-1/12$

16. Solve the equation $y' = x^2y$

- (a) $y = Ae^{3x^3}$
 (b) $y = Ae^{3x}$
 (c) $y = Ae^{x/3}$
 (d) $y = Ae^{x^3/3}$

17. Solve the differential equation $y' = x + 5y$

- (a) $y = -\frac{1}{5}x - \frac{1}{25} + Ce^{5x}$
 (b) $y = \frac{1}{5}x - \frac{1}{25} + Ce^{5x}$
 (c) $y = \frac{1}{5}x - \frac{1}{25} + Ce^{-5x}$
 (d) $y = -\frac{1}{5}x - \frac{1}{25} + Ce^{-5x}$

18. $f(x, y) = xe^{-x^2-y^2}$, find partial derivative $f_x(x, y)$

- (a) $2xye^{-x^2-y^2}$
 (b) $-2xye^{-x^2-y^2}$
 (c) $e^{-x^2-y^2}(2x^2-1)$
 (d) $e^{-x^2-y^2}(1-2x^2)$

19. $z = x^2 + xy + y^2$, $x = s + t$, $y = st$, use the Chain Rule to find $\frac{\partial z}{\partial s}$

- (a) $x+2y+xs+2ys$
 (b) $2x+y+xs+2ys$
 (c) $x+2y+xt+2yt$
 (d) $2x+y+xt+2yt$

20. Find the directional derivative of $f(x, y, z) = x^2 + y^2 + z^2$ at the point $P = (2, 1, 3)$ in the direction of the vector $u = [-2, -1, -3]$

- (a) $-\sqrt{14}$
 (b) $-2\sqrt{14}$
 (c) $-3\sqrt{14}$
 (d) $-4\sqrt{14}$