

T MATYC
CALCULUS A TEST
Spring 2005

1. Find $\lim_{x \rightarrow \infty} \frac{x^3 + 5x}{2x^3 - x^2 + 4}$.

- A. DNE B. $-\frac{1}{2}$ C. $\frac{1}{2}$ D. ∞

2. State the domain of $R(x) = x^2 + \sqrt{2x - 1}$.

- A. $(-\infty, \infty)$ B. $[\frac{1}{2}, \infty)$ C. $[0, \infty)$ D. $[-\frac{1}{2}, \infty)$

3. Find $\lim_{x \rightarrow -4} \frac{\frac{1}{4} + \frac{1}{x}}{4 + x}$.

- A. $\frac{1}{16}$ B. -16 C. $-\frac{1}{16}$ D. 16

4. If f is continuous and $\int_0^4 f(x)dx = 10$, find $\int_0^2 f(2x)dx$.

- A. 5 B. 10 C. 2 D. Not enough information

5. Find an equation of the normal line to the parabola $y(x) = x^2 - 5x + 4$ that is parallel to the line $x - 3y = 5$.

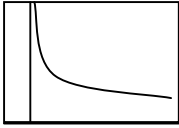
- A. $y = \frac{1}{3}x - \frac{1}{3}$ B. $y = \frac{1}{3}x - 3$ C. $y = 3x - \frac{1}{3}$ D. $y = 3x - 3$

6. Find the total length of the path traveled by a baseball during the first 8 seconds if its velocity is given by $v(t) = -9.8t + 49$ and its original height is 1 m above the ground.

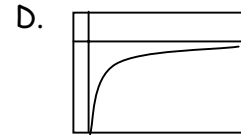
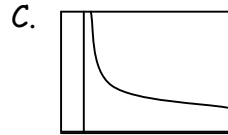
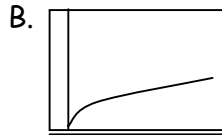
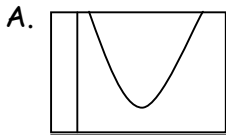
- A. 79.4 m B. 202.9 m C. 123.5 m D. 158.8 m

7. Suppose that the cost (in \$) for a company to produce x pairs of a new line of jeans is $C(x) = 2000 + 3x + 0.01x^2 + 0.0002x^3$. Find the marginal cost for the 100th pair of jeans.
- A. \$1.00 B. \$2600.00 C. \$110.00 D. \$11.00
8. Differentiate $g(t) = t^3 \cos t$.
- A. $3t^2 - \sin t$ B. $3t^2 + \cos t$
 C. $3t^2 \cos t - t^3 \sin t$ D. $3t^2 \cos t + t^3 \sin t$
9. Find the 27th derivative of $f(x) = \cos x$.
- A. $-\sin x$ B. $\sin x$ C. $\cos x$ D. $-\cos x$
10. If $f(x) = e^x g(x)$ where $g(0) = 2$ and $g'(0) = 5$, find $f'(0)$.
- A. e^7 B. $\frac{5}{2}$ C. 10 D. 7
11. A ladder 10 ft long rests against a vertical wall. Let θ be the angle between the top of the ladder and the wall and let x be the distance from the bottom of the ladder to the wall. If the bottom of the ladder slides away from the wall, how fast does x change with respect to θ when $\theta = \frac{\pi}{3}$?
- A. 15 ft/rad B. 5 ft/rad C. 10 ft/rad D. 2 ft/rad
12. If $F(x) = f(g(x))$ where $f(-2) = 3$, $f'(-2) = 4$, $f'(5) = 3$, $g(5) = -2$, and $g'(5) = 6$, find $F'(5)$.
- A. 12 B. 48 C. 24 D. 0
13. Find the derivative of $y = e^{e^x}$.
- A. $y = e^{xe^x}$ B. $y = e^{x+e^x}$ C. $y = e^{e^x}$ D. $y = xe^x$

14. Consider this graph of the derivative of a continuous function $f(x)$.



Which of the following is the graph of $f(x)$?



15. Find an equation of the tangent line to the curve at the point corresponding to the given value of the parameter.

$$x = e^{\sqrt{t}}, y = t - t^2, t = 1$$

A. $y = -\frac{2}{e}x + 2$

B. $y = -\frac{e}{2}x + 2$

C. $y = -\frac{2}{e}x + e$

D. $y = -\frac{e}{2}x + e$

16. Find $\frac{dy}{dx}$ for $x^2y + xy^2 = 3x$.

A. $\frac{x^2}{y^2 + 2xy}$

B. $\frac{3 + 2xy + y^2}{x^2 + 2xy}$

C. $\frac{3x^2 - 2xy - y^2}{x^2 + y^2}$

D. $\frac{3 - 2xy - y^2}{x^2 + 2xy}$

17. Differentiate $f(x) = \sin x \ln(5x)$.

A. $\cos x + \frac{5}{x}$

B. $\frac{\sin x}{x} + \frac{\ln(5x)}{x}$

C. $\sin x + \frac{5}{x}$

D. $\frac{\sin x}{x} + \cos x \ln(5x)$

18. A point P is moving along the line whose equation is $y = 3x$. How fast is the distance between P and the point $(3,0)$ changing at the instant when P is at $(3,8)$ if x is decreasing at the rate of 2 units/sec at that instant?

A. -6 units/sec

B. 3 units/sec

C. 2 units/sec

D. -8 units/sec

19. Find the absolute minimum value for $f(x) = x^4 - 2x^2 + 3$ on the interval $[-2, 3]$.

- A. 11 B. 3 C. 2 D. 1

20. Find the critical numbers for the function $f(x) = x^4 - 4x^3$.

- A. $x = 3$ B. $x = 0, 3, 4$ C. None D. $x = 0, 3$

21. Find $\lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2}$.

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

22. AllVol Packing Company needs to manufacture some open-topped boxes with the base twice as long as it is wide. If each box must hold 36 ft^3 of orange confetti, find the minimum surface area of one box, to the nearest whole number.

- A. 22 cm^2 B. 54 cm^2 C. 62 cm^2 D. 77 cm^2

23. Find f given that $f''(x) = 12x^2 + 6x - 4$, $f(0) = 4$, $f(1) = 1$.

- A. $x^4 + x^3 - 2x^2 - 3x + 4$ B. $6x^3 + 3x^2 - 4x + 4$
C. $x^4 - x^3 + 2x^2 + 3x - 4$ D. $x^3 + x^2 - x + 1$

24. Evaluate $\int_{-2}^{-1} \left(4y^3 + \frac{2}{y^3} \right) dy$.

- A. $\frac{107}{4}$ B. $\frac{105}{4}$ C. $\frac{63}{4}$ D. $\frac{-63}{4}$

25. Evaluate $\int e^x \sqrt{1 + e^x} dx$.

- A. $\frac{2}{3}(1 + e^x)^{3/2} + c$ B. $\frac{3}{2}(1 + e^x)^{3/2} + c$ C. $(1 + e^x) + c$ D. $\frac{2}{3}(e^x)^{3/2} + c$

	correct responses
1	C
2	B
3	C
4	A
5	A
6	B
7	D
8	C
9	B
10	D
11	B
12	C
13	B
14	B
15	A
16	D
17	D
18	C
19	C
20	D
21	B
22	B
23	A
24	D
25	A