

Honors Calculus AB
Final Exam: Multiple Choice

Name _____
5/2/2003

Answer 17 of the following 20 multiple choice problems. Clearly write the letter of your choice in the appropriate spaces below. Please mark answers only to the 17 problems you want graded. Good luck!

1. _____

11. _____

2. _____

12. _____

3. _____

13. _____

4. _____

14. _____

5. _____

15. _____

6. _____

16. _____

7. _____

17. _____

8. _____

18. _____

9. _____

19. _____

10. _____

20. _____

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1. The area in the first quadrant bounded by the curve $y = x^2$ and the line $y - x - 2 = 0$ is equal to
- (A) $3/2$
 - (B) $2/3$
 - (C) $7/6$
 - (D) $10/3$
 - (E) $9/2$

2. Evaluate the limit: $\lim_{x \rightarrow 5} \frac{\sqrt{x+4} - 3}{x-5}$.
- (A) $-1/6$
 - (B) 0
 - (C) $1/6$
 - (D) 1
 - (E) 6

3. Evaluate the limit: $\lim_{h \rightarrow 0} \frac{\sin(\frac{\pi}{2} + h) - \sin(\frac{\pi}{2})}{h}$.
- (A) -1
 - (B) 0
 - (C) 1
 - (D) $\pi/2$
 - (E) None of the above

4. If $f(x) = e^{1/x}$, then $f'(1)$ equals:
- (A) $-e$
 - (B) -1
 - (C) 0
 - (D) 1
 - (E) e

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5. The position of a particle P on a line is given by the equation $s(t) = t^3 + t^2 - t - 3$.
On which interval is the particle moving to the right?

- (A) $t > -1$
- (B) $t < -1/3$ or $t > 1$
- (C) $t < -1$ or $t > 1/3$
- (D) $-1 < t < 1/3$
- (E) $t < 1/3$

6. Define $F(x) = \int_x^1 \ln t dt$. Find $F'(2)$.

- (A) $-\ln(2)$
- (B) e^2
- (C) $\ln(2)$
- (D) e
- (E) 1

7. Evaluate $\int \frac{x}{\sqrt{9-x^2}} dx$.

- (A) $(-1/2) \cdot \ln \sqrt{9-x^2} + C$
- (B) $\sin^{-1}(x/3) + C$
- (C) $-\sqrt{9-x^2} + C$
- (D) $(-1/4) \cdot \sqrt{9-x^2} + C$
- (E) $2\sqrt{9-x^2} + C$

8. If $f(x) = \log_2 3x$, then $f'(x)$ equals

- (A) $1/(3x)$
- (B) $\ln(3x)$
- (C) $1/(x \ln 2)$
- (D) e^{3x}
- (E) $2e^{3x}$

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9. Let $f(t) = (1/t^2) - 4$ and $g(t) = \cos t$.
Find the derivative of the composition $(f \circ g)(t)$.
- (A) $2 \sec^2 t \tan t$
(B) $\tan t$
(C) $2 \sec t \tan t$
(D) $\frac{2}{t^3 \sin t}$
(E) $-\frac{2}{\cos^3 t}$
10. Given the initial value problem $\frac{dy}{dx} = ky$, with conditions $y(0) = 10$ and $y(2) = 18$.
The constant of proportionality k equals:
- (A) .153
(B) .212
(C) .293
(D) .314
(E) .400
11. Let f be a twice-differentiable function (a function whose first and second derivatives both exist). $f''(c) = 0$ could mean that
- (A) f has a local maximum at $x = c$
(B) f has a local minimum at $x = c$
(C) f has a point of inflection at $x = c$
(D) None of the above
(E) Any of the above
12. Find the slope of the tangent to the curve $x^2y + 3x^2y^3 = 4$ at the point $(1, -1)$.
- (A) 0.4
(B) 0.8
(C) 1.0
(D) 1.6
(E) 2.0

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13. Evaluate the limit $\lim_{x \rightarrow -\infty} \frac{4x^2 - 8x}{8x^2 + 6x + 5}$.

- (A) $-\infty$
- (B) .5
- (C) 1.5
- (D) 8
- (E) ∞

Use the chart below to answer questions 14 and 15 about the graph of a continuous function f whose first and second derivatives are also continuous. The only critical points of f are located at $x = 0$ and $x = 2$.

x	-1	0	1	2	3	4
f'	+	0	+	0	-	-
f''	+	0	-	-	-	-

14. The function f has a local minimum at:

- (A) 0
- (B) 2
- (C) 3
- (D) 4
- (E) Both 2 and 4

15. The function f is decreasing on which intervals?

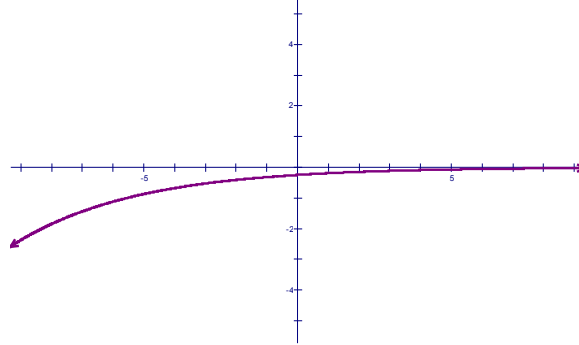
- (A) $(-1, 1]$
- (B) $[1, 4]$
- (C) $(0, 3]$
- (D) $(2, 4)$
- (E) None of these intervals

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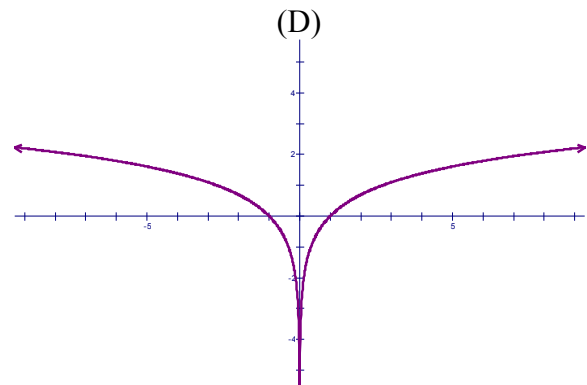
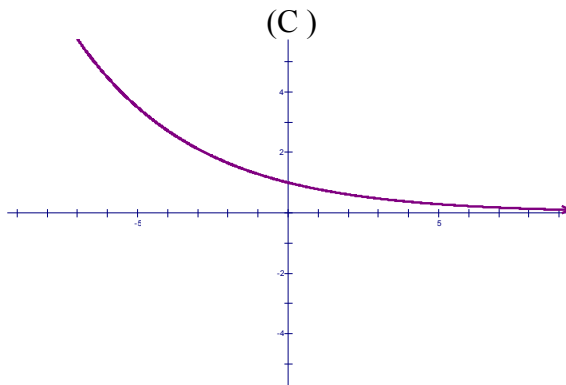
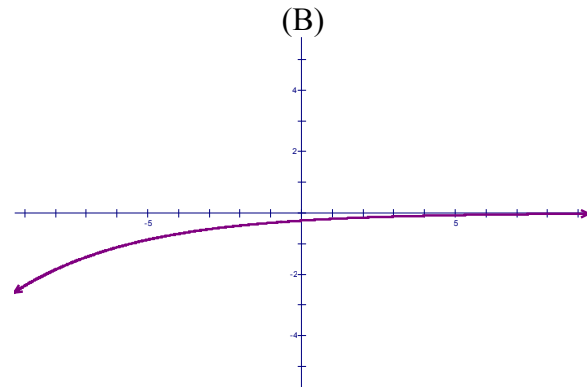
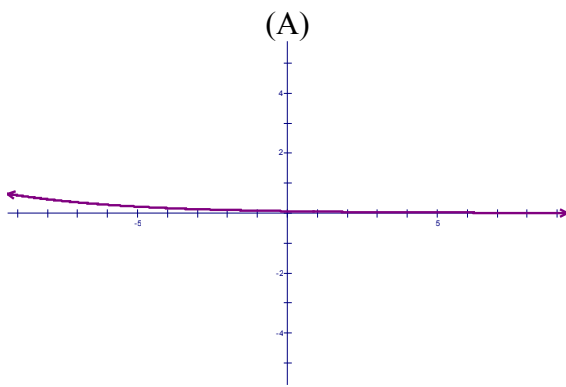
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Use the graph below to answer questions 16 and 17.

This graph represents the derivative of some continuous function, f



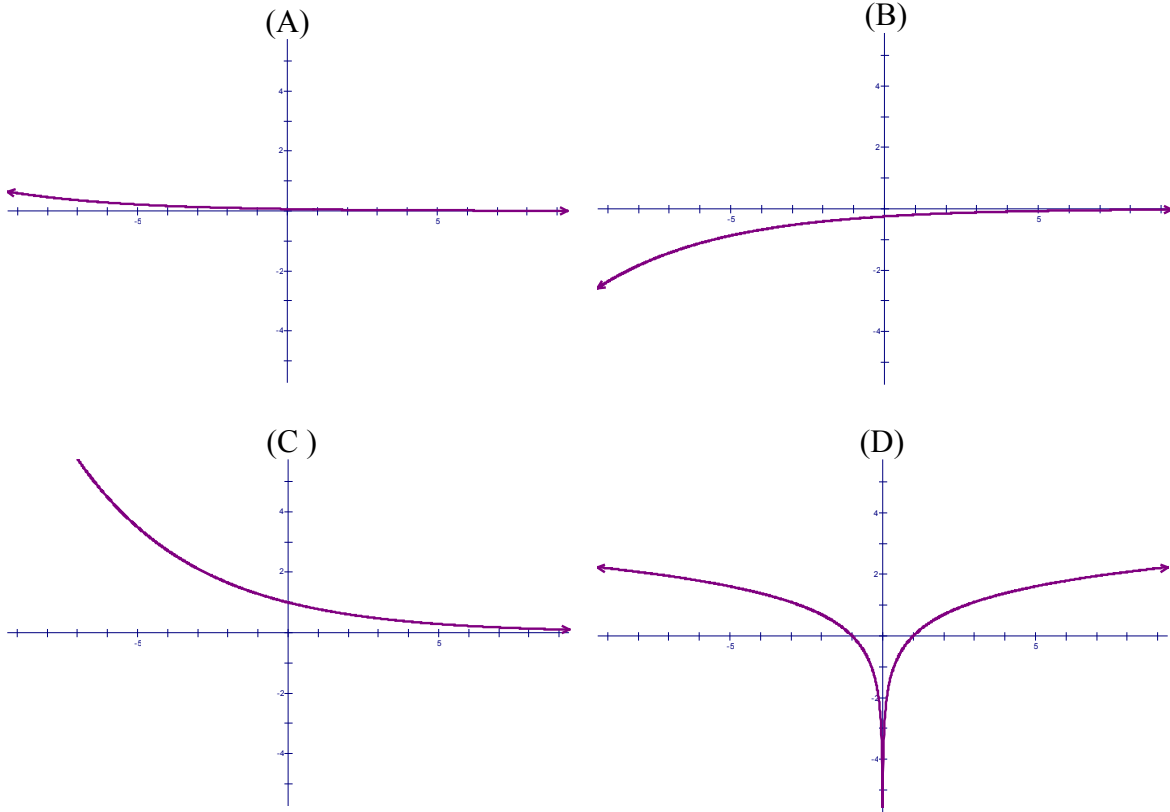
16. Which of the following graphs could represent the graph of f ?



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17. Which of the following graphs could represent the graph of f'' ?



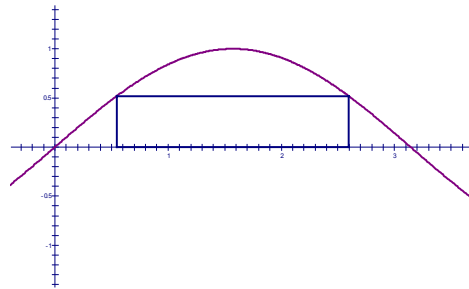
18. Evaluate $\int x^3 e^x dx$.

- (A) $e^x(3x^2 + x^3) + C$
- (B) $3x^2 e^x + C$
- (C) $e^x(x^3 + 3x^2 + 6x + 6) + C$
- (D) $e^x(x^3 - 3x^2 + 6x - 6) + C$
- (E) $x^3 e^x + C$

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19. A rectangle is to be inscribed under one arch of the sine curve as shown below. What is the area of the largest rectangle that can be formed?



- (A) 3.14
(B) 2.21
(C) 1.12
(D) 0.94
(E) .021
20. Let $L(x)$ be the linearization of the function $f(x) = \sqrt{1+x}$ at $x = 0$. The difference between L and f at $x = 0.2$ would be:

- (A) 0.250
(B) 1.095
(C) 1.000
(D) 0.005
(E) 0.002