Calculus AB
Multiple Choice

Name_____

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
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: $\lim_{x \to 5} \frac{\sqrt{x+4} - 3}{x - 5}$.

   (A) –1/6
   (B) 0
   (C) 1/6
   (D) 1
   (E) 6

3. Evaluate the limit: $\lim_{h \to 0} \frac{\sin(\frac{\pi}{2} + h) - \sin(\frac{\pi}{2})}{h}$.

   (A) -1
   (B) 0
   (C) 1
   (D) π/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 $\lim_{x\to-\infty} \dfrac{4x^2-8x}{8x^2+6x+5}$.

(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 Maximum 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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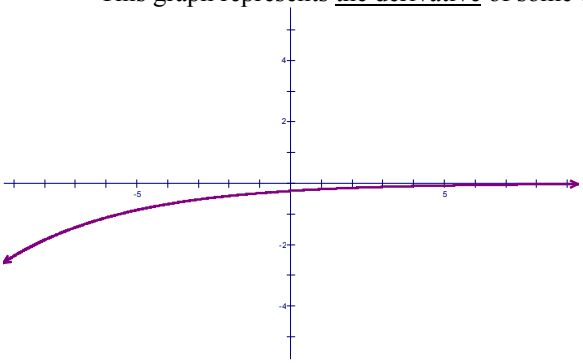
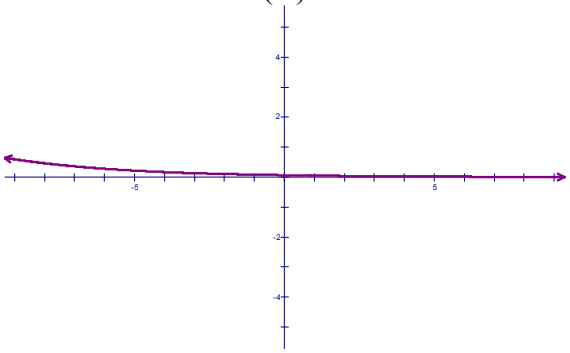
Use the graph below to answer questions 16 and 17.

This graph represents the derivative of some continuous function, f

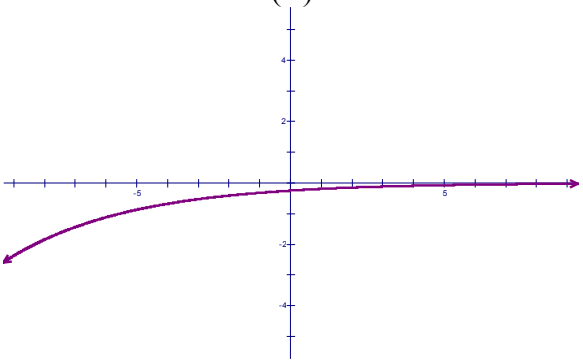


16. Which of the following graphs could represent the graph of f?

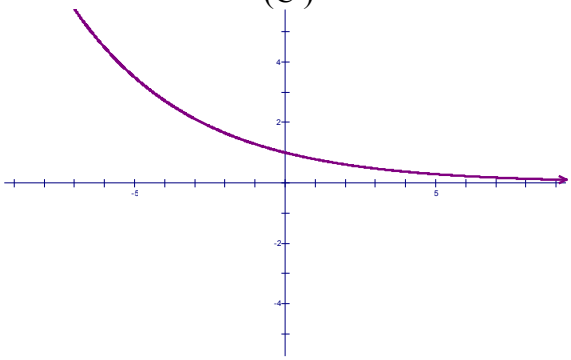
(A)



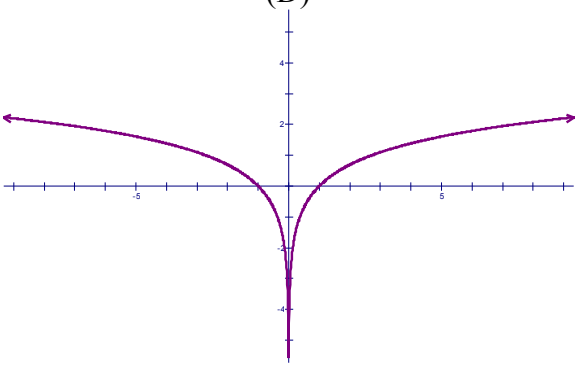
(B)



(C)



(D)



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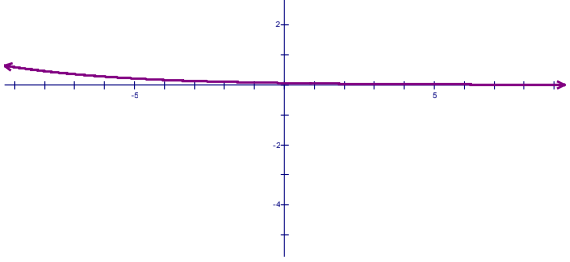
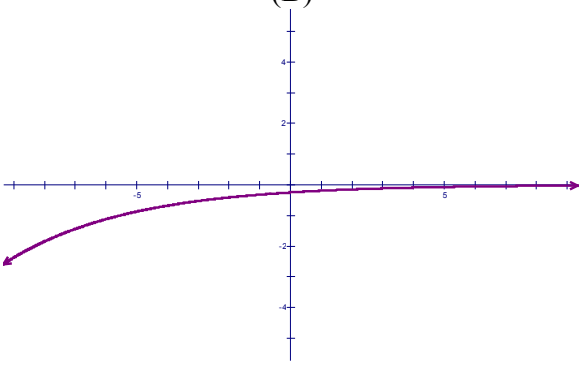
17. Which of the following graphs could represent the graph of f'' ?

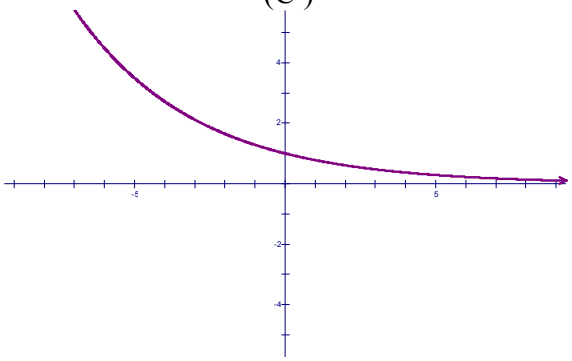
(A)



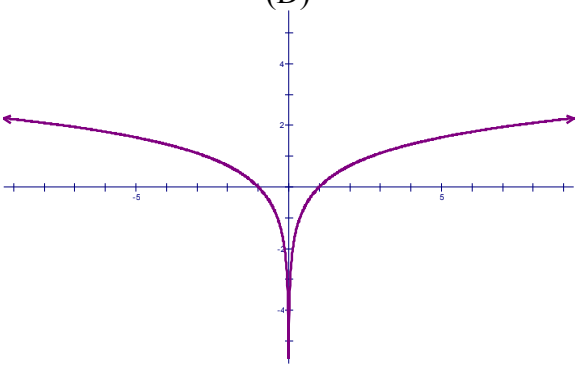
(B)



(C)



(D)



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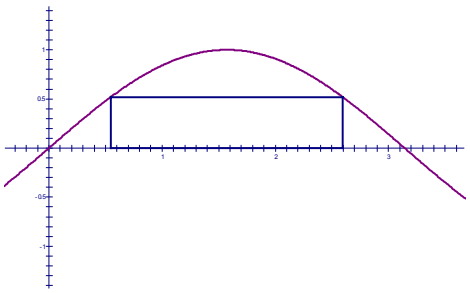
19. A rectangle is to be inscribed under one arch of the sine curve as shown below. What is the area of the largest rectangle that can be formed?



(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

ANSWER KEY

01 D
02 C
03 B
04 A
05 C
06 A
07 C
08 C
09 A
10 C
11 E
12 B
13 B
14 B
15 D
16 C
17 C
18 D
19 C
20 D