

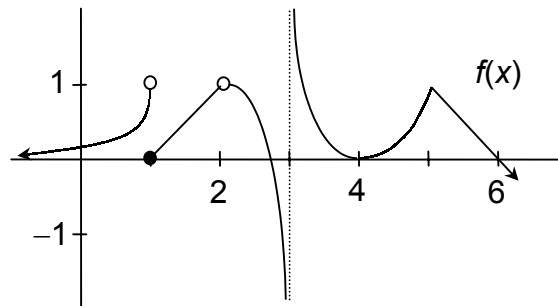
AP CALCULUS (AB)
Final Exam
Test – A

Name _____
Date _____
Period _____

Calculators may be used for the entire exam, but you must show all steps in your solutions unless otherwise stated.

Use the figure at the right to answer the following questions.

1. Where is $f(x)$ discontinuous? Explain.



2. Where is $f(x)$ not differentiable? Explain.

Answer the following.

3. Use limits to identify the asymptotes of $f(x) = \frac{5x^2 + 3}{4x^2 - 1}$.

4. Find the normal line to the circle $x^2 + y^2 = 25$ at the point $(3, 4)$.

5. The diameter of a circle is increased from 2.00 to 2.02 mm. Use differentials to approximate the change in the circle's area.

Let R be the region bounded by the x -axis and $h(x) = \frac{\sin x}{2 - \cos x}$ on the interval $0 \leq x \leq \pi$. Answer the following. (Use the calculator for the computation).

6. Use trapezoids and four subintervals approximate the area of R .

7. Find the exact area of R .

8. Find the volume formed by revolving R about $y = -1$.

9. Find the average value of $h(x)$ on the interval $0 \leq x \leq \pi$.

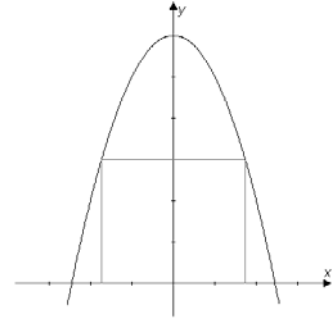
A particle's velocity is modeled by the function $v(t) = 4\cos(t)$ m/s. Answer the following.

10. If the initial position of the particle is $s(0) = 2$ m, find the particle's position the first time its acceleration is $a(t) = 4$ m/s².

11. Find the total distance traveled by the particle over the time interval $t = 0$ sec to the first time its acceleration is $a(t) = 4$ m/s².

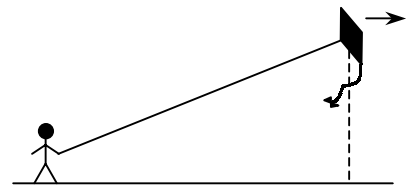
Answer the following.

12. A rectangle is drawn so that it rests on the x -axis and each upper vertex touches the parabola $y = 6 - x^2$. Find the dimensions of the rectangle that would give the maximum area. (Use the calculator for the computation).



13. Solve $\frac{dy}{dx} = \frac{k}{y^2}$ if $y(0) = 0$ and $y(9) = 3$.

14. Mr. Deck skipped class one day to fly a kite. The kite began moving horizontally while at a height of 120 feet. 200 feet of string was released and the rate of increase in string length was 2 ft/sec. How fast was the kite moving horizontally?



Answer the following.

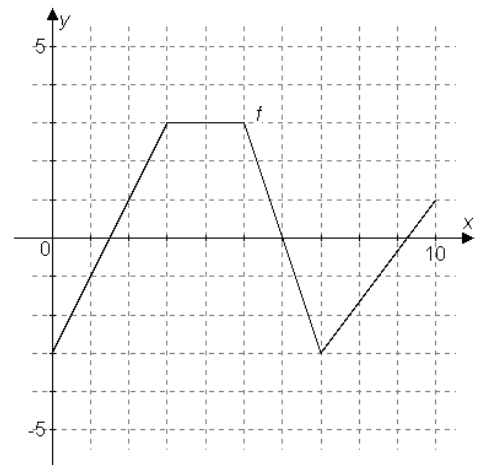
15. Find $\lim_{h \rightarrow 0} \frac{\sec(a+h) - \sec(a)}{h}$.

16. Find $\lim_{x \rightarrow \infty} \frac{\ln(x)}{\sqrt[3]{x}}$.

Let $F(x) = \int_0^x f(t) dt$, where f is the function whose graph is shown. Answer the following.

17. Find $F(5)$.

18. Identify intervals of increase and decrease in F .



19. Locate the value of x where the maximum of F exists.

Answers

1. $x = 1$ (jump)
 $x = 2$ (removable)
 $x = 3$ (infinite)
2. $x = 1, 2, 3$ (discontinuous)
 $x = 5$ (corner)
3. Horizontal at $y = 5/4$, since $\lim_{x \rightarrow \pm\infty} f(x) = 5/4$
Vertical at $x = \pm 1/2$, since $\lim_{x \rightarrow -1/2^-} f(x) = \infty$ and $\lim_{x \rightarrow 1/2^+} f(x) = \infty$
4. $y - 4 = \frac{4}{3}(x - 3)$
5. $0.02\pi \text{ cm}^2$
6. 1.027
7. $\ln(3)$
8. 8.430
9. $\ln(3)/\pi$
10. -2 m
11. 12 m
12. $2\sqrt{2} \times 4$
13. $y = \sqrt[3]{3t}$
14. 5/2 ft/sec
15. $\sec a \tan a$
16. 0
17. 6
18. $(1.5, 6) \cup (9.25, 10)$
19. $x = 6$