Calculus AB/BC — Chapter 3 Review

Name:_____ Per:____ Date:_____

1. Graph $f(x)=\begin{cases}-2, & x<0\\ x^2-4x-2, & 0\le x\le 4\\ 2, & x>4\end{cases}$. Find all points where the function is discontinuous.

2. Find the average rate of change of $f(x)=\sin x+\cos x$ over $[-\pi,\pi]$.

3. Find the instantaneous rate of change of $f(x)=\sin x+\cos x$ at $x=\dfrac{\pi}{2}$.

4. Determine if the limit exists. $\lim\limits_{x\to 0}\dfrac{\dfrac{1}{x+8}-\dfrac{1}{8}}{x}$

5. Find the points where $f(x)=4x^3+x^2-2x+3$ has horizontal tangents.

6. Find the horizontal tangents of the curve $f(x)=9x^4-12x^2+4$.

7. Find the limit, if it exists. $\lim\limits_{x\to 0}\dfrac{-2x^{-1}-5x^{-3}}{4x^{-2}+x^{-1}}$

8. A rock is thrown vertically upward from the surface of the moon at and reaches a height of $s = 24t - 0.8t^2$ meters in t seconds.

A. What is the rock's instantaneous velocity at $t = 10$ sec?

B. How long does it take for the rock to reach its highest point?

9. Find all values of x for which the function is differentiable.

A. $y=\ln x^2$ **B.** $y=\sqrt{\dfrac{1-x}{1+x^2}}$ **C.** $y=(2x-7)^{-1}(x+5)$

10. The function $A=\dfrac{\sqrt{3}}{2}s^2$ describes the area, A, in square centimeters, of an equilateral triangle with sides each measure s cm. Find the instantaneous rate of change of area with respect to s when $s = 10$ cm.

11. For $y=2\sqrt{x}$, find the **(A)** tangent and **(B)** normal to the curve at $x = 9$.

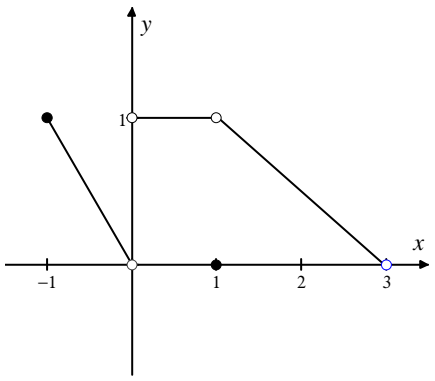
12. At time t, the position of a body moving along the s-axis is $s(t)=(t-2)^2(t-4)$ m. Find the body's acceleration each time the velocity is zero.

13. Use the given values of the functions and their derivatives to find the value of the indicated derivative at $x = 0$. $u(0) = 5, u'(0) = -3, v(0) = -1, v'(0) = 2$

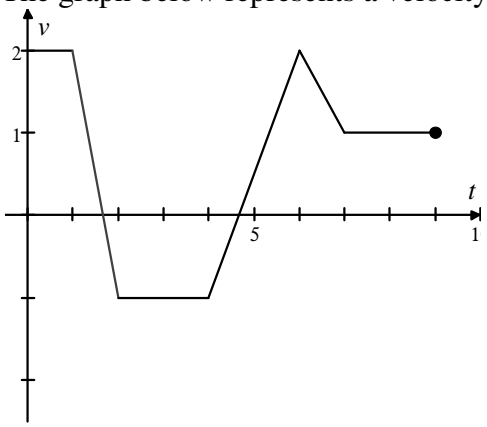
A. $\dfrac{d}{dx}(uv)$ **B.** $\dfrac{d}{dx}\left(\dfrac{u}{v}\right)$

14. Find *ds*/*dt* for $s = 4 - t^2 \sin t$.

15. For the graph of *f*(*x*) below, find **(A)** $\lim\limits_{x\to 0} f(x)$, **(B)** $\lim\limits_{x\to 1} f(x)$, and **(C)** $\lim\limits_{x\to 3} f(x)$.



16. The graph below represents a velocity graph. When does the acceleration equal to zero?



17. A particle's position is given by the function $s(t) = \tan t + \dfrac{8}{3}\cos t$. Find the particle's velocity when time is measured in seconds and position is measured in feet at time $t = \dfrac{\pi}{6}$.

18. Find $\dfrac{dy}{dx}$ if $y = \dfrac{x^3 + 2}{2x^3 + 5}$.

19. When is a function not differentiable? Make an illustration of the different types.

20. Find the average rate of change for $f(x) = \dfrac{1}{2}e^x$ over $[0, 2]$.