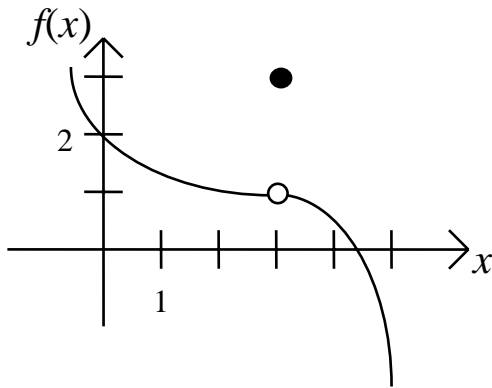


Use the functions on this page to answer questions 1 through 9 on your test.



$$g(x) = \begin{cases} 1 & \text{if } x < 1 \\ x & \text{if } 1 < x < 2 \\ x^2 & \text{if } x \geq 2 \end{cases}$$

$$k(x) = \frac{x + 3}{x^3 + 3x^2}$$

Show any work necessary to complete a problem. Use d.n.e. for does not exist wherever appropriate.

(1 - 8) Evaluate. (3 points each)

1.) $f(0)$

2.) $f(3)$

3.) $g(1)$

4.) $g(2)$

5.) $\lim_{x \rightarrow 3} f(x)$

6.) $\lim_{x \rightarrow 1} g(x)$

7.) $\lim_{x \rightarrow 2} g(x)$

8.) $\lim_{x \rightarrow 0} k(x)$

9.) List the values of x where the given function is discontinuous: (5 points each)

(i) $f(x)$ _____

(ii) $g(x)$ _____

(iii) $k(x)$ _____

10.) Evaluate: (7 points)

$$\lim_{x \rightarrow 5} (x^2 - 2x + 3)$$

11.) Evaluate: (9 points)

$$\lim_{x \rightarrow 1} \frac{x^2 - x - 2}{x - 1}$$

12.) A driver is traveling along a country road according to the equation $s(t) = -4t^3 + 28t^2$ where s is his distance in miles from the time he starts and t is his time in hours. Find his average velocity (average rate of change) for his first 2 hours ($t = 0$ until $t = 2$). (9 points)

13.) Find the difference quotient $\frac{f(x+h) - f(x)}{h}$ for $f(x) = 3 - 2x$. (12 points)

- 14.) Use the definition $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ to find the derivative of $f(x) = x^2 - 5x$. (12 points)

- 15.) Given that when $g(x) = \sqrt[3]{3x^2} + 5$, $g'(x) = \frac{2}{\sqrt[3]{9x}}$ find the equation of the tangent line to $g(x)$ at $x=3$. (12 points)