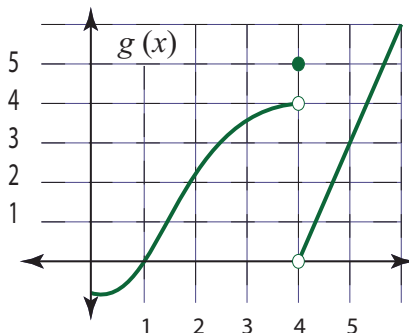
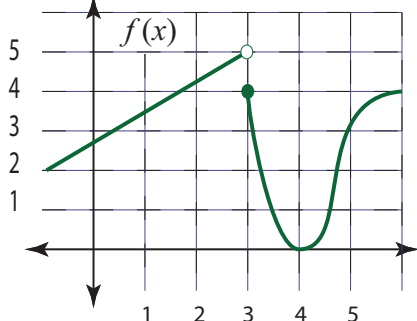


Calculus I. Test 1 Review.

Make sure you also study all the quizzes, then notes and homework examples!

1. Use the graphs shown for  $f$  and  $g$  to evaluate each function value or limit (or answer DNE).



a)  $f(3) = ?$

b)  $g(4) = ?$

c)  $\lim_{x \rightarrow 3^+} f(x) = ?$

d)  $\lim_{x \rightarrow 3} f(x) = ?$

e)  $\lim_{x \rightarrow 4^-} [f(x) + g(x)] = ?$

f)  $\lim_{x \rightarrow 3} \frac{f(x)}{g(x)} = ?$

g)  $\lim_{x \rightarrow 1} \frac{g(x)}{f(x)} = ?$

2. Given:  $f(x) = \begin{cases} \frac{(7-x)}{3x^2-21x} & \text{for } x < 7 \\ 7x & \text{for } 7 \leq x \end{cases}$

a)  $f(7) = ?$

b)  $\lim_{x \rightarrow 7^+} f(x) = ?$

c)  $\lim_{x \rightarrow 7^-} f(x) = ?$

d)  $\lim_{x \rightarrow 7} f(x) = ?$

e) Is  $f(x)$  continuous at  $x = 7$ ? If not, what kind of discontinuity is it? \_\_\_\_\_

3. Find the following limits.

a)  $\lim_{x \rightarrow 3} \frac{x^2 + 3x - 1}{5 - x} = ?$

b)  $\lim_{x \rightarrow 1} \frac{4x^2 + 3x - 7}{2x - 2} = ?$

4. Find the following limits.

a)  $\lim_{x \rightarrow \infty} \left( \frac{3x}{1 - x} + e^{-\left(\frac{x^2 + 3x}{2x}\right)} \right)$

b)  $\lim_{x \rightarrow 0} \tan^{-1} \left( \frac{2x^3 + 4x}{10x^2 + 100x + 57} \right)$

c)  $\lim_{x \rightarrow 4} \tan^{-1} \left( \frac{-1}{(x - 4)^2} \right)$

d)  $\lim_{x \rightarrow \infty} \tan^{-1} \left( e^{\left(\frac{-1}{(x-4)^2}\right)} \right)$

5. If  $f(x) = 5x + x^3$  then write the limit that will define  $f'(x)$ . (Just set it up, don't find the limit.)

6. If  $f(x) = 5 + x^{\sin(2x)}$  then write the limit that will define  $f'(x)$ . (Just set it up, don't find the limit.)

7. Find  $\lim_{h \rightarrow 0} \frac{(4(x + h) - 3) - (4x - 3)}{h}$ .

8. If  $f'(5) = 7$  and  $f(5) = 23$  then what is the equation of the tangent line to  $f(x)$  at  $x = 5$ ?

9. If  $g(x) = \frac{x^3}{3} - x^2 + x$  and  $g'(x) = x^2 - 2x + 1$ , then find the equation of the tangent line to  $g(x)$  at  $x = -2$ .

10. Short derivatives. These are just for quick review; they may be seen as part of a test question. Find  $y'$  for each.

Power Rule:

$$y = x^2$$

$$y = 7x^{-3}$$

$$y = 2x + 1 - \frac{3}{x^2}$$

$$y = \sqrt[5]{x^7}$$

$$y = x^{\sqrt{3}}$$

Exponential:

$$y = e^x$$

$$y = 3^x$$

$$y = (\ln 2)^x$$

Trig:

$$y = \sin x$$

$$y = \cos x$$

$$y = \tan x$$

$$y = \cot x$$

$$y = \sec x$$

$$y = \csc x$$

11. Find  $y'$ . Don't simplify.

a)  $y = \frac{x^4 - \sqrt{x}}{\sin x}$

b)  $y = \frac{1}{\sqrt[7]{x^5}}$

c)  $y = x^e e^x$

d)  $y = 3^x \sin x$

e)  $y = 7x^2 e^x \csc x$

f)  $y = 2^x \tan x$

g)  $\frac{x+1}{1-\sin x}$

h)  $\frac{x+2^x}{1-x^3 e^x}$

i)  $y = 7x \cot x$

j)  $y = \frac{\sec x}{x-1}$