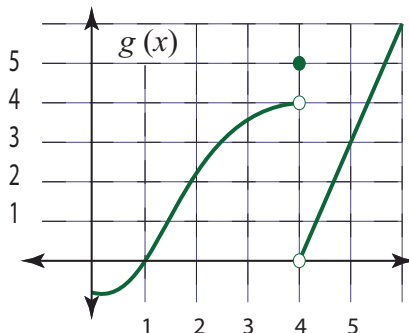
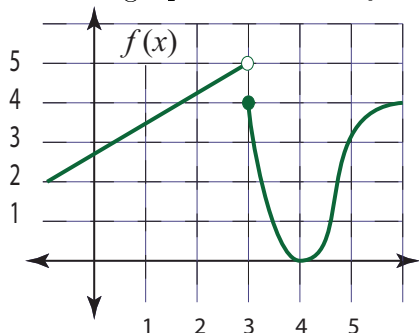


Calculus I. Sum17 Test 1 Review-Answers.

All trig and angles are in radians.

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)  $f(3) = 4$

b)  $g(4) = 5$

c)  $\lim_{x \rightarrow 3^+} f(x) = 4$

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

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

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

g)  $\lim_{x \rightarrow 1} \frac{g(x)}{f(x)} = 0$

2.

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

a)  $f(7) = 49$

b)  $\lim_{x \rightarrow 7^+} f(x) = 49$

c)  $\lim_{x \rightarrow 7^-} f(x) = \frac{-1}{21}$

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

e) Is  $f(x)$  continuous at  $x = 7$ ? If not, what kind of discontinuity is it ? No, it's a jump.

3. Find the following limits.

a)  $\lim_{x \rightarrow 3} \frac{x^2 + 3x - 1}{5 - x} = \frac{17}{2}$

b)  $\lim_{x \rightarrow 1} \frac{4x^2 + 3x - 7}{2x - 2} = \frac{11}{2}$

4. We know that  $\lim_{x \rightarrow 0} (2 + e^x) = 3$ . That means, given any  $\epsilon > 0$ , there exists a  $\delta > 0$  such that if  $0 < |x - 0| < \delta$  then  $|(2 + e^x) - 3| < \epsilon$ .  
If  $\epsilon = 0.2$ , find  $\delta$ . (Don't simplify.)

$$\underline{\delta = \ln(1.2)}$$

5. Find the following limits.

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

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

6. If  $f(x) = 3^x + 1$  then write the limit that will define the slope of the tangent at  $x = 7$ . (Just set it up, don't find the limit.)

$$m = \lim_{h \rightarrow 0} \frac{3^{(7+h)} + 1 - (3^7 + 1)}{h}$$

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

$$f'(x) = \lim_{h \rightarrow 0} \frac{5(x+h) + (x+h)^3 - (5x + x^3)}{h}$$

8. 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.)

$$f'(x) = \lim_{h \rightarrow 0} \frac{5 + (x+h)^{(\sin(2(x+h)))} - (5 + x^{\sin(2x)})}{h}$$

9.  $\lim_{h \rightarrow 0} \frac{\frac{1}{1+h} - 1}{h} = -1.$

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

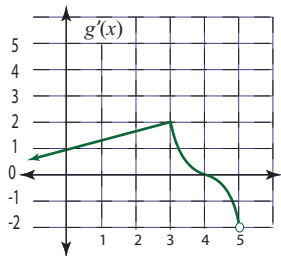
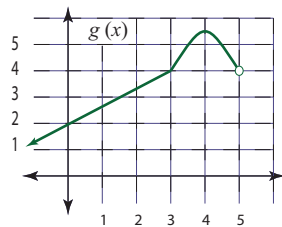
11. If  $f'(5) = 7$  and  $f(5) = 23$  then what is the equation of the tangent line to  $f(x)$  at  $x = 5$ ?

$$\underline{y = 7x - 12}$$

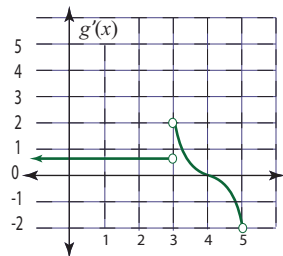
12. If  $g(x) = \frac{x^3}{3} - x^2 + x$  and  $g'(x) = x^2 - 2x + 1$ , then find the equation of the tangent line to  $g(x)$  at  $x = -2$ .

$$\underline{y = 9x + \frac{28}{3}}$$

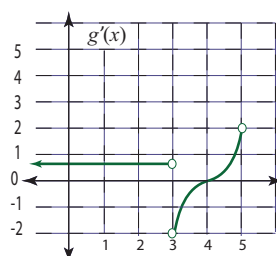
13. Given the graph of  $g(x)$ , choose the correct  $g'(x)$ .



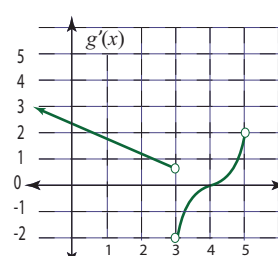
A.



B.



C.



D.

Answer: B. Note that  $g(x)$  has a constant positive slope, then a sharp point, then a positive slope that decreases to zero slope at the peak, then a negative slope.