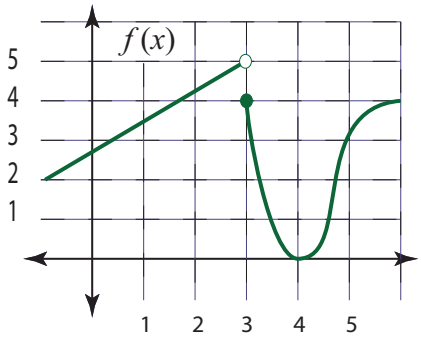
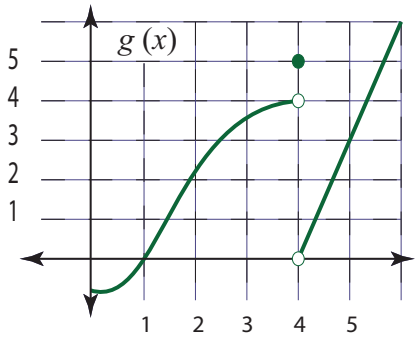
Calculus I. Fall 19 Test 1 Review-Answers.
All trig and angles are in radians.
Make sure you also study all the quizzes, then notes and homework examples!

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

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

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

f) $\lim_{x \to 3} \dfrac{f(x)}{g(x)} = DNE$

g) $\lim_{x \to 1} \dfrac{g(x)}{f(x)} = 0$

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

a) $f(7) = 49$

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

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

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

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) $\lim_{x \to 3} \dfrac{x^2 + 3x - 1}{5 - x} = \dfrac{17}{2}$

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

4. We know that $\lim_{x\to 0}(2+e^x) = 3$. 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 δ. (Don't simplify.)

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

5. Find the following limits.

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

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

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.)

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

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.)

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

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.)

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

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

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

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 $x = -2$.

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