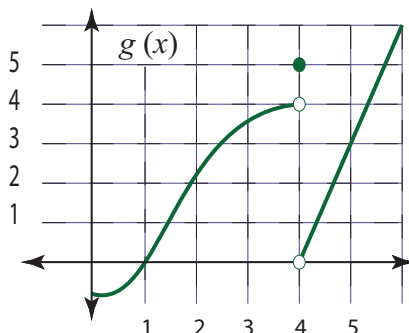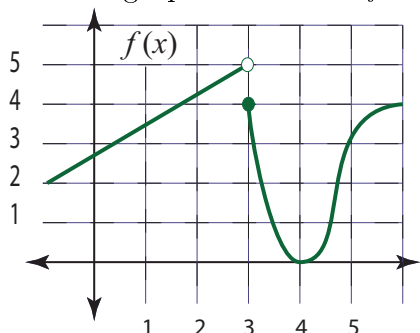Calculus I. Sum17 Test 1 Review.
Make sure you also study all the quizzes, then notes and homework examples!

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) $\lim\limits_{x \to 3^+} f(x) =?$

d) $\lim\limits_{x \to 3} f(x) =?$

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

f) $\lim\limits_{x \to 3} \dfrac{f(x)}{g(x)} =?$

g) $\lim\limits_{x \to 1} \dfrac{g(x)}{f(x)} =?$

2.

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

a) $f(7) =?$

b) $\lim\limits_{x \to 7^+} f(x) =?$

c) $\lim\limits_{x \to 7^-} f(x) =?$

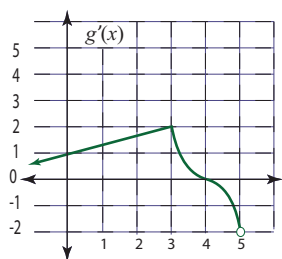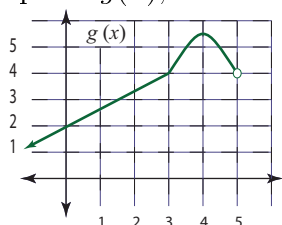d) $\lim\limits_{x \to 7} f(x) =?$

e) Is $f(x)$ continuous at $x = 7$? If not, what kind of discontinuity is it ? _____
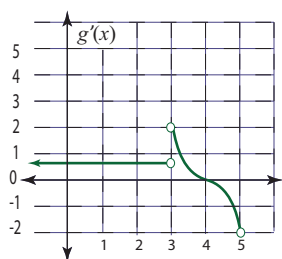
3. Find the following limits.

a) $\lim\limits_{x \to 3} \dfrac{x^2 + 3x - 1}{5 - x} =?$
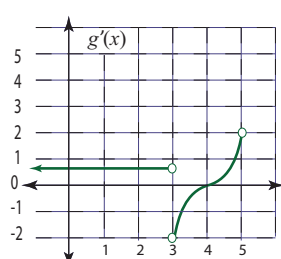
b) $\lim\limits_{x \to 1} \dfrac{4x^2 + 3x - 7}{2x - 2} =?$

4. We know that $\lim\limits_{x \to 0}(2 + e^x) = 3$. 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.)

5. Find the following limits.

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

b) $\lim\limits_{x \to -\infty} \tan^{-1} \left(\dfrac{2x^3 + 4x}{10x^2 + 100x + 57} \right)$

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.)

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.)

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.)

9. Find $\lim\limits_{h \to 0} \dfrac{\frac{1}{1+h} - 1}{h}$.

10. Find $\lim\limits_{h \to 0} \dfrac{(4(x + h) - 3) - (4x - 3)}{h}$.

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

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 $x = -2$.

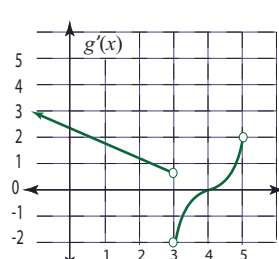13. Given the graph of $g(x)$, choose the correct $g'(x)$.

A.

B.

C.

D.

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