

# Calculus 1 Practice Test 1 (with solutions)

September 21, 2011

1. Evaluate the limit, if it exists

$$\lim_{x \rightarrow -3} \frac{x^2 - 9}{2x^2 + 7x + 3}$$

Answer:  $\frac{6}{5}$

- 2.

$$\lim_{x \rightarrow 7} \frac{\sqrt{x+2} - 3}{x - 7}$$

Answer:  $\frac{1}{6}$

3. For what value of the constant  $c$  is the function  $f$  continuous on  $(-\infty, \infty)$

$$f(x) = \begin{cases} cx + 2, & x < 2 \\ x^2 - c, & x \geq 2 \end{cases}$$

Answer:  $\frac{2}{3}$

4. Find the vertical and horizontal asymptotes for the function  $f(x) = \frac{2x+1}{x-2}$

Answer: vert. asymptote at  $x = 2$  and horiz. asymptote at  $y = 2$

(to find the horizontal asymptotes, take the limit as  $x \rightarrow \pm\infty$ )

5. Use the definition of derivative to find the derivative of the function

$$f(x) = x^2 + x$$

Answer:  $f'(x) = 2x + 1$  but you cannot use the short-cut rules.

You must use  $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

6. Use the shortcut rules to find the derivative of the function

$$f(x) = \frac{x^2 + x - 1}{\sqrt{x}}$$

Answer:  $\frac{3}{2}x^{\frac{1}{2}} + \frac{1}{2}x^{-\frac{1}{2}} + \frac{1}{2}x^{-\frac{3}{2}}$

7. Use the shortcut rules to find the derivative of the function

$$f(x) = \sin(x) \times x^7$$

Answer:  $\cos(x)x^7 + \sin(x)7x^6$

8. Use the shortcut rules to find the derivative of the function

$$f(x) = \frac{2xe^x}{3x + 100}$$

Answer:  $\frac{(2e^x + 2xe^x)(3x + 100) - 2xe^x \times 3}{(3x + 100)^2}$