

# Math 201 Quiz 3B

September 5, 2014

Name: ANSWERS

Instructions: No calculators. Use your own scrap. Write your fully simplified answers in the space provided.

1. Let  $f(x) = 3x^3$ , find and simplify the following:

(a)  $f(2) = 24$     (b)  $f(a^2) = 3a^6$     (c)  $f(x+h) = 3h^3 + 9h^2x + 9hx^2 + 3x^3$

(d)  $\frac{f(x+h)-f(x)}{h} = 3h^2 + 9hx + 9x^2$     (e)  $\frac{f(x)-f(a)}{x-a} = 3a^2 + 3ax + 3x^2$

2. Using interval notation, state the domain of  $f(t) = \frac{1}{\sqrt{2-t}-\sqrt{3+t}}$ .  $D: [-3, -1/2) \cup (-1/2, 2]$

3. Now suppose  $f(t) = \frac{1}{x}$ , find and simplify  $\frac{f(x+h)-f(x)}{h} = -\frac{1}{xh+x^2}$

4. Even, odd or neither?: (a)  $f(x) = x|x|$  odd    (b)  $y = x^7 - x^5 + 4$  neither    (c)  $y = \frac{x^4}{x^5+1}$  neither

5. If  $f(x) = x^2 - 2x$  and  $g(x) = 3x + 1$ , find:

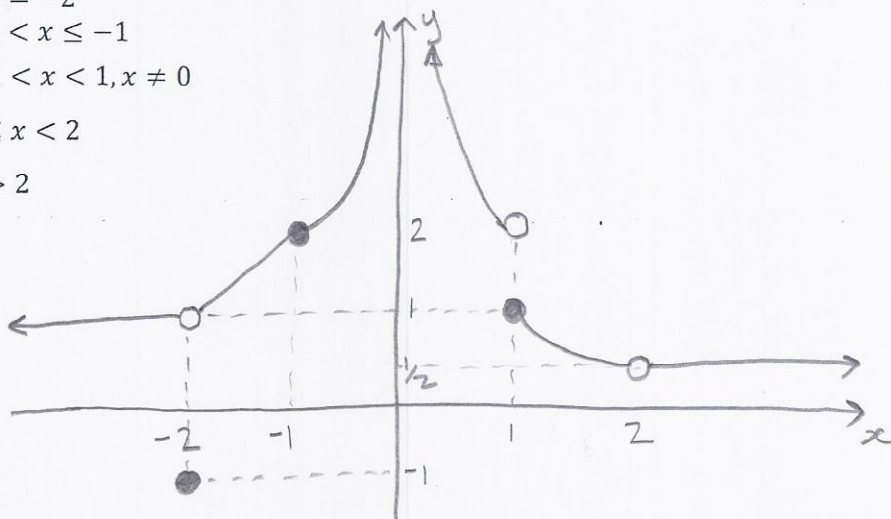
(a)  $f \circ g = 9x^2 - 1$     (b)  $fg = 3x^3 - 5x^2 - 2x$     (c)  $\frac{f}{g} = \frac{x^2 - 2x}{3x + 1}$

(d)  $\text{dom}\left(\frac{f}{g}\right) = (-\infty, -1/3) \cup (-1/3, \infty)$     (e)  $f - g = x^2 - 5x - 1$     (f)  $\text{dom}(f - g) = (-\infty, \infty)$

6. Find the exact values.

(a)  $\cos \frac{5\pi}{3} = 1/2$     (b)  $\sin \left(\frac{7\pi}{4}\right) = -\frac{1}{\sqrt{2}} = -\frac{\sqrt{2}}{2}$     (c)  $\csc \frac{5\pi}{6} = 2$

7. Sketch the graph of  $f(x) = \begin{cases} 1 & , x < -2 \\ -1 & , x = -2 \\ x + 3 & , -2 < x \leq -1 \\ 1 + \frac{1}{x^2} & , -1 < x < 1, x \neq 0 \\ \frac{1}{x} & , 1 \leq x < 2 \\ \frac{1}{2} & , x > 2 \end{cases}$



Bonus problems:

(a)  $\lim_{\theta \rightarrow 0} \frac{1 - \cos \theta}{\theta} = 0$     (b)  $\lim_{t \rightarrow 0} \frac{\sin t}{t} = 1$     (c)  $\lim_{x \rightarrow 0} \frac{\sqrt{x+4}-2}{x} = 1/4$

(d) For  $f(x)$  in problem 7 above, find  $\lim_{x \rightarrow -2} f(x) = 1$