

Hon Pre-Calc  
Test Correction Quiz  
Chapter 1

Name \_\_\_\_\_

Show All Work!!! Circle All Final Answers!! No Calculators!!!

Short Answer

1. Find the average rate of change formula from  $x = \frac{\pi}{4}$  to  $x = \frac{\pi}{4} + h$  in simple fraction form using the difference quotient for the following function:

$$f(x) = \tan x$$

2. Given:  $f(x) = -2x^3 + 3x^2 + 12x - 18$

a) Use interval notation to state where the function is increasing and decreasing.

Inc = \_\_\_\_\_

Dec = \_\_\_\_\_

b) Determine any relative minimum(s).

\_\_\_\_\_

3. Given:  $f(x) = x^2 - 2x$

$$g(x) = \frac{1}{x-3}$$

Find the domain and range of  $g(f(x))$ .

Domain = \_\_\_\_\_

Range = \_\_\_\_\_

4. Given:  $f(x) = \frac{2x+1}{1-x}$ . Find  $f^{-1}(x)$

5.  $z$  varies jointly as the square root of  $x$  and the square of  $w$ , and inversely as  $y$ .  $z = -\frac{1}{2}$  when  $x = 9$ ,  $w = 2$ , and  $y = 6$ .  
Find the constant of variation.

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## Test Correction Quiz

### Chapter 1

Name \_\_\_\_\_

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Short Answer

1. Find the average rate of change formula from  $x = \frac{\pi}{4}$  to  $x = \frac{\pi}{4} + h$  in simple fraction form using the difference quotient for the following function:

$$f(x) = \tan x \quad \tan(a+b) = \frac{\tan a + \tan b}{1 - \tan a \tan b}$$

$$\tan\left(\frac{\pi}{4}\right) = 1$$

$$\frac{\tan\left(\frac{\pi}{4} + h\right) - \tan\left(\frac{\pi}{4}\right)}{h} = \frac{\frac{\tan\frac{\pi}{4} + \tanh}{1 - \tan\frac{\pi}{4}\tanh} - 1}{h} = \frac{\frac{1 + \tanh}{1 - \tanh} - 1}{h}$$

$$\frac{\frac{1 + \tanh}{1 - \tanh} - 1}{h} = \frac{\frac{1 + \tanh - (1 - \tanh)}{1 - \tanh}}{h} = \frac{\frac{2\tanh}{1 - \tanh}}{h} = \frac{2\tanh}{h(1 - \tanh)}$$

2. Given:  $f(x) = -2x^3 + 3x^2 + 12x - 18$

a) Use interval notation to state where the function is increasing and decreasing.

Inc =  $(-1, 2)$

Dec =  $(-\infty, -1) \cup (2, \infty)$

b) Determine any relative minimum(s).

$y = -25$  at  $x = -1$   $(-1, -25)$

$$\begin{aligned} f(-1) &= (-2)(-1)^3 + 3(-1)^2 + 12(-1) - 18 \\ f(-1) &= (-2)(-1) + 3(1) - 12 - 18 \\ f(-1) &= 2 + 3 - 12 - 18 \\ f(-1) &= (-25) \end{aligned}$$

$$\frac{1^2 - 2(1) - 3}{1 - 2 - 3} = -4$$

$$\frac{1}{(1-3)(1+1)} = \frac{1}{(-2)(2)} = -\frac{1}{4}$$

$$\frac{1}{(x^2 - 2x) - 3} \rightarrow \frac{1}{(x-3)(x+1)}$$

$$x^2 - 2x = 3$$

$$x^2 - 2x - 3 = 0$$

$$(x-3)(x+1) = 0$$

$$x = -1, 3$$

3. Given:  $f(x) = x^2 - 2x$

$$g(x) = \frac{1}{x-3}$$

Find the domain and range of  $g(f(x))$ .

Domain =  $(-\infty, -1) \cup (-1, 3) \cup (3, \infty)$

Range =  $(-\infty, -\frac{1}{4}] \cup (0, \infty)$

$Df(-\infty, \infty) \rightarrow (-\infty, -1) \cup (-1, 3) \cup (3, \infty)$

$Rf(-\infty, \infty) \rightarrow (-\infty, 3) \cup (3, \infty)$

$Dg(-\infty, 3) \cup (3, \infty)$

4. Given:  $f(x) = \frac{2x+1}{1-x}$ . Find  $f^{-1}(x)$

$$x = \frac{2y+1}{1-y}$$

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

$$x(1-y) = 2y+1$$

$$x - xy = 2y+1$$

$$x-1 = 2y+xy$$

$$x-1 = y(2+x)$$

$$\frac{x-1}{2+x} = y$$

$$\frac{3x}{2+x} = x$$

$$\frac{2\left(\frac{x-1}{2+x}\right) + 1}{1 - \left(\frac{x-1}{2+x}\right)}$$

$$\frac{2x-2+2+x}{2+x}$$

$$\frac{3x}{2+x} = \frac{3}{2+x}$$



5.  $z$  varies jointly as the square root of  $x$  and the square of  $w$ , and inversely as  $y$ .  $z = -\frac{1}{2}$  when  $x = 9$ ,  $w = 2$ , and  $y = 6$ . Find the constant of variation.

$$z = \frac{K\sqrt{x}w^2}{y}$$

$$-\frac{1}{2} = \frac{K\sqrt{9}(2)^2}{6}$$

$$-\frac{1}{2} = \frac{K(3)(4)}{6}$$

$$-\frac{1}{2} = \frac{12K}{6}$$

$$-\frac{1}{2} = 2K$$

$$-\frac{1}{4} = K$$

$$K = -\frac{1}{4}$$

$$-\frac{1}{2} = \frac{-\frac{1}{4}(\sqrt{9})(2)^2}{6}$$

$$-\frac{1}{2} = \frac{-\frac{1}{4}(3)(4)}{6}$$

$$-\frac{1}{2} = -\frac{3}{6} = -\frac{1}{2} \quad \checkmark$$

1)

$$f(x) = \tan x$$

$$x = \frac{\pi}{4}, \frac{\pi}{4} + h$$

$$\frac{\tan(\frac{\pi}{4} + h) - \tan \frac{\pi}{4}}{h} = \frac{\frac{\tan \frac{\pi}{4} + \tanh}{1 - \tan \frac{\pi}{4} \tanh} - \tan \frac{\pi}{4}}{h}$$

$$\frac{\frac{1 + \tanh}{1 - (1)(\tanh)} - 1}{h} = \frac{\frac{1 + \tanh}{1 - \tanh} - \frac{1 - \tanh}{1 - \tanh}}{h}$$

$$\frac{\frac{1 + \tanh - (1 - \tanh)}{1 - \tanh}}{h} = \frac{\frac{1 + \tanh - 1 + \tanh}{1 - \tanh}}{h}$$

$$\frac{2 \tanh}{1 - \tanh} \times \frac{1}{h} = \frac{2 \tanh}{h(1 - \tanh)}$$