Sample Quiz and HW 2

N

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This test totals 0 points and you get 0 minutes to do it. If you are brave or don’t care, you can put down your name. Good luck!

1. Calculate the difference quotient of the functions
   (a) \( f(x) = (x + 2)^2 \) at point \( x = (-1) \)
   (b) Find the equation of the tangent for the above curve at \((-1,1)\)

2. Find the domains of the following functions
   (a) \( f(x) = \frac{x+3}{x-7} \)
   (b) \( f(x) = e^x \)
   (c) \( f(x) = \sqrt{3x - 20} \)

3. If \( f = \sin(2x) \) and \( g = \frac{1}{x+3} \), find \( f \circ g \) and its domain.

4. Solve quadratic equation \( x^2 + 7x + 12 = 0 \)

5. Page 60, Question 9 (a-f)

6. Page 61, Questions 30,31,33,34

7. Find the vertical asymptotes of \( f(x) = \frac{2}{x^2+3x+2} \) and \( g(x) = \frac{2}{2\cos x - 1} \)
HW2 solutions

1. a) Diff quotient at $x = -1$

\[
\frac{f(x + h) - f(x)}{h} \quad \text{at} \quad \lim_{h \to 0} x = -1
\]

\[
= \frac{(-1 + h + 2)^2 - (-1 + 2)^2}{h}
\]

\[
= \frac{(h + 1)^2 - 1^2}{h}
\]

\[
= \frac{h^2 + 2h}{h} = h + 2
\]

b) slope of tangent $= \lim_{h \to 0} h + 2 = 2$

tangent passes through $(-1, 1)$

$y = mx + c$, $m = 2$

$y = 2x + c$

plug in $x = -1$, $y = 1$

$1 = -2 + c$, $c = 3$

$y = 2x + 3$

"Note: $\lim_{h \to 0} (\text{difference quotient at } a') = \text{slope of tangent at } a'"
2) Domain

a) \( f(x) = \frac{x+3}{2x-7} \)

If denominator becomes 0, that is a problem
\( 2x-7 = 0 \) \( \Rightarrow x = \frac{7}{2} \)
So domain = \( \mathbb{R} \setminus \{7/2\} \)

b) \( f(x) = e^x \)

Domain = \( \mathbb{R} \)

c) \( f(x) = \sqrt{3x-20} \)

You can't take square root of negative numbers
So \( 3x-20 \geq 0 \), so \( x \geq \frac{20}{3} \)
\( [\frac{20}{3}, \infty) \) = domain

3) Refer to HW 1 solution

4) \( x^2 + 7x + 12 = 0 \)

\( (x+3)(x+4) = 0 \)
\( x = -3, x = -4 \)

5, 6 - We will do similar problems in class

7) \( f(x) \rightarrow \infty \) if denominator \( \rightarrow 0 \) asymptotes
\( f(x) = x^2 + 3x + 2 = 0 \) \( \Rightarrow (x+2)(x+1) = 0 \), \( x = -2, x = -1 \)
\( g(x) = 2 \cos x - 1 = 0 \) \( \Rightarrow \cos x = \frac{1}{2} \) \( x = \left( \frac{\pi}{3} + 2\pi n \right) \)