Remote Lesson 6.1 HOMEWORK ANSWERS

Use interval notation to write the domain for each function. Then graph the function on your calculator. If the function is continuous, say continuous. If it is not, give the name and location of the discontinuity.

1. $f(x) = \frac{5x+3}{x^2+8x+7}$ $x^2 + 8x + 7 \neq 0$

$(x+7)(x+1) \neq 0$

$x \neq -7, x \neq -1$ remember we are only removing 2 numbers

Domain: $(-\infty, -7) \cup (-7, -1) \cup (-1, \infty)$

2. $f(x) = \frac{x-2}{x^2-4}$ $x^2 - 4 \neq 0$

$(x+2)(x-2) \neq 0$

$x \neq \pm 2$

Domain: $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$

3. $f(x) = \sqrt{9-6x}$ $9 - 6x \geq 0$ (the function under radical has to be nonnegative)

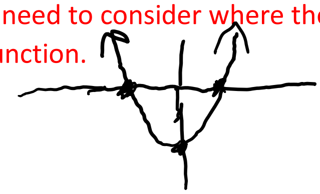
$-6x \geq -9$

$x \leq \frac{3}{2}$ (remember to turn inequality if you mult/divide by negative)

Domain $(-\infty, \frac{3}{2}]$

4. $f(x) = \sqrt[3]{5x+4}$ A cube root has no restrictions. Domain $(-\infty, \infty)$

5. $f(x) = \frac{6x^2+2}{\sqrt{x^2-8}}$ $x^2 - 8 > 0$ The function under the radical cannot be negative, nor can it be 0 because it is in the denominator. The function under the radical is a parabola, so we need to consider where the parabola is positive. Look at a graph of the function.



The function is positive when its graph is above the x-axis.

The x-intercepts are where $x^2 - 8 = 0$, or $x = \pm 2\sqrt{2}$

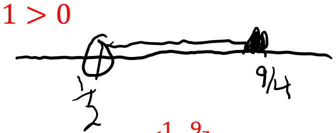
The domain of f is $(-\infty, -2\sqrt{2}) \cup (2\sqrt{2}, \infty)$

6. $f(x) = \frac{\sqrt{9-4x}}{\sqrt{2x-1}}$

This is a challenge problem! First we need to look at this as the square root of a fraction, that is $\sqrt{\frac{9-4x}{2x-1}}$. Now, if we consider the fraction under radical—fractions are positive when both the numerator and denominator are positive OR when both the numerator and denominator are negative. So that is what we will do

Both positive: $9 - 4x \geq 0\ AND\ 2x - 1 > 0$

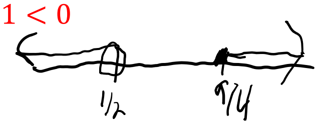
$x \leq \frac{9}{4}\ AND\ x > \frac{1}{2}$



AND means where both are true so $(\frac{1}{2}, \frac{9}{4}]$

Both negative: $9 - 4x \leq 0\ AND\ 2x - 1 < 0$

$x \geq \frac{9}{4}\ AND\ x < \frac{1}{2}$



This yields no answer as there is no interval where both are true, but it MUST always be considered.

Domain of f: $(\frac{1}{2}, \frac{9}{4}]$

7. $f(x) = \frac{5x+4}{|5x+4|}$

The absolute value has no impact on the domain. Our only concern is making sure the denominator is not 0.

Domain of f: $(-\infty, -\frac{4}{5}) \cup (-\frac{4}{5}, \infty)$

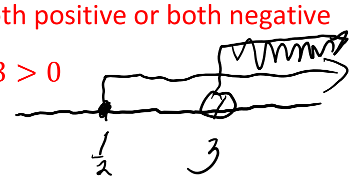
8. $f(x) = \sqrt{\frac{8x-4}{x-3}}$

This is like question #6. We look at both positive or both negative

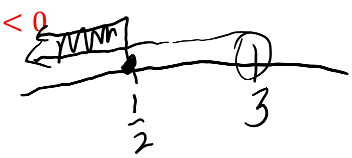
Both positive: $8x - 4 \geq 0\ AND\ x - 3 > 0$

$x \geq \frac{1}{2}\ AND\ x > 3$

$(3, \infty)$



Both negative: $8x - 4 \leq 0\ AND\ x - 3 < 0$



$x \leq \frac{1}{2}\ AND\ x < 3$

$(-\infty, \frac{1}{2}]$

Domain of f: $(-\infty, \frac{1}{2}] \cup (3, \infty)$

9. $f(x) = \sqrt[4]{9-x^2}$ The 4th root (4 is called an index) acts like the square root. The function Under the radical must not be negative. The function is a parabola. we need the parabola to be positive, we will look at its graph

Here, the function is positive between the x-intercepts
So domain of f: $[-3,3]$

10. $f(x) = (9x-2)^{\frac{3}{2}}$ We will change this function to its radical form. There are two Correct ways in which this can be done.

$\sqrt{(9x-2)^3}$ or $(\sqrt{9x-2})^3$

The one on the right is much easier, because we won't have to (9x-2) that way. On the right our only concern is that the function under the radical stays positive

$9x - 2 \geq 0$

$x \geq \frac{2}{9}$

Domain of f: $[\frac{2}{9}, \infty)$