بسم الله الرحمن الرحيم

King Abdulaziz University

Review for sections 0.1 and 0.2

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- أنقر على Start لبداء الاختبار.
- يحتوي هذا الأختبار على عشرون سؤالاً.
- عند الانتهاء من الاختبار أنقر على End للحصول على النتيجة.
- بالتوفيق إن شاء الله.

Calculus I
Math110

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Version 1.0

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Start Answer each of the following.

1. Solve the inequality $3x + 2 < 11$

- $(-\infty, 3)$
- $(-\infty, 3]$
- $(3, \infty)$
- $[3, \infty)$

2. Solve the inequality $x^2 - 3x - 4 > 0$

- $(-\infty, -4) \cup (1, \infty)$
- $(-\infty, -4] \cup [1, \infty)$
- $(-\infty, -1) \cup (4, \infty)$
- $(-\infty, -1] \cup [4, \infty)$

3. Solve the inequality $\dfrac{x-4}{x+1} < 2$

- ☐ $(-\infty, -1] \cup [4, \infty)$
- ☐ $(-\infty, -6) \cup (-1, \infty)$
- ☐ $(-\infty, -1) \cup (6, \infty)$
- ☐ $(-\infty, -1] \cup [4, \infty)$

4. Find the distance between the points $(2, 1), (4, 4)$

- ☐ $\pm\sqrt{13}$
- ☐ ± 13
- ☐ 13
- ☐ $\sqrt{13}$

5. Determine if the given points are collinear. $(3, -1), (5, 3), (-1, -10)$

☐ No

☐ Yes

6. Find the slope m of the line through the points $A(4, 1)$ and $B(0, -8)$.

☐ $\frac{-4}{9}$

☐ $m = \frac{4}{9}$

☐ $m = \frac{9}{4}$

☐ $m = \frac{-9}{4}$

7. Find a second point on the line with slope $\frac{2}{3}$ and passes through $(1, 2)$.

- ☐ $(4, 4)$
- ☐ $(3, 5)$
- ☐ $(-2, 4)$
- ☐ $(4, 0)$

8. Find an equation of the line with slope $m = 3$ passing through point $(8, 5)$.

- ☐ $y = 3x – 7$
- ☐ $y = 3x + 43$
- ☐ $y = 3x + 23$
- ☐ $y = 3x – 19$

9. Determine if the two lines are parallel, perpendicular, or neither. $y – 7x – 1 = 0$ and $2y - 14x = -6$.

☐ perpendicular

☐ parallel

☐ neither

10. Find an equation of the line through the point $(–5, –3)$ and parallel to the line $y + 6x = 25$.

☐ $y = –6x–23$

☐ $y = -1/6x + 39$

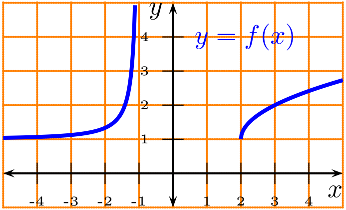
☐ $y = 6x–11$

☐ $y = –6x–33$

11. Find an equation of the line through the point $(-2, 8)$ and perpendicular to the line $2y + 14x + 58 = 0$.

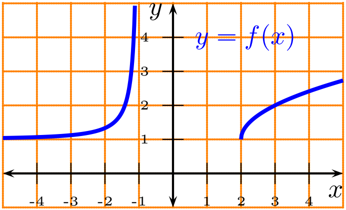
- ☐ $y = 7x + 54$
- ☐ $y = 1/7x + 58/7$
- ☐ $y = -7x - 6$
- ☐ $y = -1/7x - 16$

12. Use the graph of $y = f(x)$ to evaluate $f(3)$



- ☐ 1
- ☐ 2
- ☐ -1
- ☐ 0

13. Using the graph to find the domain of f.



- $[1, \infty)$
- $(-\infty, -1] \cup [2, \infty)$
- $(-\infty, -1) \cup [2, \infty)$
- $(1, \infty)$

14. Find the domain of the function $f(x) = \sqrt{5x-7}$.

- $\mathbb{R}$
- $[7/5, \infty)$
- $\mathbb{R} \setminus \{7/5\}$
- $(-\infty, 7/5]$

15. Find the domain of the function $f(x) = \sqrt[3]{-5x-6}$.

- $[-6/5, \infty)$
- $\mathbb{R} \setminus \{-6/5\}$
- $(-\infty, -6/5]$
- $\mathbb{R}$

16. Find the domain of the function $f(x) = \dfrac{5x+1}{x^2 - x - 56}$.

- $(-\infty, -8) \cup (-8, 7) \cup (7, \infty)$
- $(-\infty, -7) \cup (-7, 8) \cup (8, \infty)$
- $(-\infty, -7] \cup [-7, 8] \cup [8, \infty)$
- $(-\infty, -8] \cup [-8, 7] \cup [7, \infty)$

17. Find the domain of the function $f(x) = \sqrt[4]{100 - x^2}$.

- ☐ $[-10, 10]$
- ☐ $(-\infty, -10) \cup (-10, 10) \cup (10, \infty)$
- ☐ $(-\infty, -10] \cup [10, \infty)$
- ☐ $(-10, 10)$

18. Find the indicated function value. $f(x) = \sqrt{x + 8}$; $f(6)$

- ☐ $\pm\sqrt{14}$
- ☐ $6\sqrt{14}$
- ☐ $\sqrt{14}$
- ☐ 14

19. Find all intercepts of the graph $f(x) = \dfrac{x^2 - 4}{x + 1}$.

- ☐ x-inter(s): $x = \pm 2$; y-inter:$y = -4$.
- ☐ x-inter(s): $x = \pm 2, -1$; y-inter:$y = -4$.
- ☐ x-inter(s): $x = 2$; y-inter:$y = -4$.
- ☐ x-inter(s): $x = -2$; y-inter:$y = -4$.

20. Find all zeros of $f(x) = 3x^2 - 6x + 2$.

- ☐ $\frac{-6 \pm \sqrt{12}}{6}$
- ☐ $\frac{6 \pm \sqrt{-12}}{6}$
- ☐ $\frac{-6 \pm \sqrt{-12}}{6}$
- ☐ $\frac{6 \pm \sqrt{12}}{6}$

End

Score: Correct

Answers:

Points: Percent:

Letter Grade:

Solutions to Quizzes

Solution to 1.

$$\begin{aligned} 3x+2 &< 11 && \text{subtract 2} \\ 3x &< 11-2 \\ 3x &< 9 && \text{divide by 3} \\ x &< 3 \end{aligned}$$

Hence the solution is $(-\infty, 3)$. ■

Solution to 2.

First, we write	$x^2 - 3x - 4 > 0$	we are looking for a positive sign.
Second, set	$x^2 - 3x - 4 = 0$	to find the zeroes.
We have	$(x-4)(x+1) = 0$	by factor.
Hence	$x = -1, 4.$	

Third, use the real line to find the sign of $x - 4$ and $x + 1$.

$-\infty$	-1	4	∞
Test Value	-2	0	5
sign of $x-4$	$-2-4=-6 \quad (-)$	$0-4=-4 \quad (-)$	$5-4=1 \quad (+)$
sign of $x+1$	$-2+1=-1 \quad (-)$	$0+1=1 \quad (+)$	$5+1=6 \quad (+)$
sign of $(x+1)(x-4)$	$(-)\cdot(-)=+$	$(-)\cdot(+)=-$	$(+)\cdot(+)=+$

Hence the solution is $(-\infty, -1) \cup (4, \infty)$. ■

Solution to 3.

$$\frac{x-4}{x+1} < 2 \Leftrightarrow \frac{x-4}{x+1} - 2 < 0 \qquad \text{subtract 2 from all sides .}$$

$$\Leftrightarrow \frac{x-4}{x+1} - \frac{2(x+1)}{(x+1)} < 0 \qquad \text{make a common denominator}$$

$$\Leftrightarrow \frac{x-4-2x-2}{x+1} < 0 \qquad \text{simplify}$$

$$\Leftrightarrow \frac{-x-6}{x+1} < 0 \qquad \text{we are looking for negative sign.}$$

Next, we find the zeros of the numerator and the denominator. The real zeros of the numerator and the denominator are $-x-6=0 \Leftrightarrow x=-6$ and $x+1=0 \Leftrightarrow x=-1$. So the expression's test intervals are $(-\infty,-6),(-6,-1)$, and $(-1,\infty)$. We excluded 4 because we have less than sign and excluded -1 because it makes the denominator equal zero and dividing by zero is not allowed. Now, we use the real line to find the sign of $-x-6$ and $x+1$.

	$-\infty$ to -6	-6 to -1	-1 to ∞
Test Value	-7	-2	0
sign of $-x-6$	$-(-7)-6=1 \quad (+)$	$-(-2)-6=-4 \quad (-)$	$-(0)-6=-6 \quad (-)$
sign of $x+1$	$-7+1=-6 \quad (-)$	$-2+1=-1 \quad (-)$	$0+1=1 \quad (+)$
sign of $\frac{-x-6}{x+1}$	$(+)/(-)=-$	$(-)/(-)=+$	$(-)/(+)=-$

We find the $(-)$signs in the interval $(-\infty,-6)$ or $(-1,\infty)$.
Hence the solution is $(-\infty,-6)\cup(-1,\infty)$. ■

Solution to 4.

$$\begin{aligned} d((2,1),(4,4)) &= \sqrt{(4-2)^2+(4-1)^2} \\ &= \sqrt{(2)^2+(3)^2} \\ &= \sqrt{4+9} = \sqrt{13}. \end{aligned}$$

■

Solution to 5. No. The slope of the line joining the points $(3,-1),(5,3)$ is

$$m=\frac{\Delta y}{\Delta x}=\frac{3-(-1)}{5-3}=\frac{4}{2}=2,$$

while the slope of the line joining the points $(5,3),(-1,-10)$ is

$$m=\frac{\Delta y}{\Delta x}=\frac{-10-3}{-1-5}=\frac{-13}{-6}=\frac{13}{6}.$$

■

Solution to 6. The slope of the line through the points $A(4,1)$ and $B(0,-8)$ is

$$m = \frac{\Delta y}{\Delta x} = \frac{-8-1}{0-4} = \frac{-9}{-4} = \frac{9}{4}.$$

■

Solution to 7. Since $m = \frac{\Delta y}{\Delta x} = \frac{2}{3}$, this mean that to get another point from the point $(1, 2)$ just add (or subtract) $\Delta x = 3$ to the x-coordinate of the point $(1, 2)$ and add (or subtract) $\Delta y = 2$ to the y-coordinate of the point $(1, 2)$. Hence $(1 + 3, 2 + 2) = (4, 4)$ is a point on the line. ■

Solution to 8.

$y - y_1 = m(x - x_1)$	Point-Slope form
$y - 5 = 3(x - 8)$	Substitute 5 for y_1,
	8 for x_1,
	and 3 for m.
$y - 5 = 3x - 24$	Simplify
$y = 3x - 19$	Solve for y.

■

Solution to 9.

$$\begin{aligned} y - 7x - 1 &= 0 & 2y - 14x &= -6 \\ y &= 7x + 1 & 2y &= 14x - 6 \\ & & y &= 7x - 3 \\ m_1 &= 7 & m_2 &= 7 \end{aligned}$$

Hence the lines are parallel. ■

Solution to 10. we find the slope of the line $y + 6x = 25$

$$y + 6x = 25 \qquad \text{Isolate } y \text{ term.}$$
$$y = -6x + 25 \qquad \text{Point-Slope form}$$

Now, since the line is parallel to $y + 6x = 25$ then $m = -6$ and passes through the point $(-5, -3)$.

$$y - y_1 = m(x - x_1) \qquad \text{Point-Slope form}$$
$$y - (-3) = -6(x - (-5)) \qquad \text{Substitute}$$
$$y + 3 = -6(x + 5) \qquad \text{Simplify}$$
$$y + 3 = -6x - 30 \qquad \text{Simplify}$$
$$y = -6x - 33$$

■

Solution to 11.

we find the slope of the line $2y + 14x + 58 = 0$

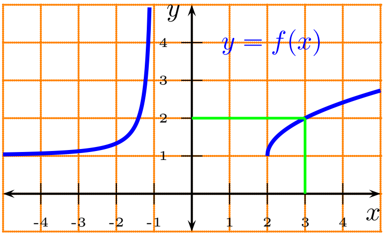
$$
\begin{aligned}
2y &= -14x - 58 && \text{Isolate } y \text{ term.} \\
y &= -7x - 29 && \text{Solve for } y. \\
y &= -7x - 29 && \text{Point-Slope form}
\end{aligned}
$$

Now, since the line is perpendicular to the line $2y+14x+58 = 0$ then the $m = -1/-7 = 1/7$ and passes through the point $(-2, 8)$.

$$
\begin{aligned}
y - y_1 &= m(x - x_1) && \text{Point-Slope form} \\
y - 8 &= 1/7(x - (-2)) && \text{Substitute} \\
y - 8 &= 1/7x + 2/7 && \text{Simplify} \\
y &= 1/7x + 2/7 + 8 && \text{Simplify} \\
y &= 1/7x + 58/7
\end{aligned}
$$

■

Solution to 12. From the graph we see that $f(3) = 2$.



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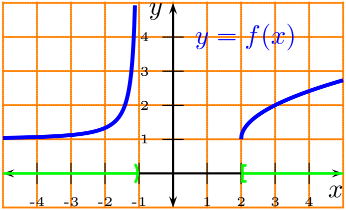
Solution to 13. Looking at the graph we see that

$$D(f) = (-\infty, -1) \cup [2, \infty).$$



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Solution to 14. $f(x) = \sqrt{5x - 7}$ is even root function. Then it is defined if

$$5x - 7 \geq 0$$
$$5x \geq 7$$
$$x \geq 7/5$$

Hence $D(f) = [7/5, \infty)$. ■

Solution to 15. The function $f(x) = \sqrt[3]{-5x-6}$ is an odd function and hence $D(f) = \mathbb{R}$. ■

Solution to 16. The function is a rational function. The domain is $\mathbb{R} \setminus \{$ zeros of $x^2 - x - 56\}$.

$$\begin{aligned} x^2 - x - 56 &= 0 \\ (x-8)(x+7) &= 0 \\ x - 8 = 0 &\text{ or } x + 7 = 0. \\ x = 8 &\text{ or } \quad x = -7. \end{aligned}$$

Hence $D(f) = \mathbb{R} \setminus \{-7, 8\} = (-\infty, -7) \cup (-7, 8) \cup (8, \infty)$. ■

Solution to 17. The function is an even root function. Hence $f(x) = \sqrt[4]{100 - x^2}$ is defined if

$100 - x^2 \geq 0$	$\Leftrightarrow 100 \geq x^2$	move x^2 to the other side
	$\Leftrightarrow x^2 \leq 100$	rewrite the inequality
	$\Leftrightarrow \sqrt{x^2} \leq \sqrt{100}$	take the square root
	$\Leftrightarrow \lvert x\rvert \leq 10$	$\sqrt{x^2} = \lvert x\rvert$ use properties of
	$\Leftrightarrow -10 \leq x \leq 10$	absolute value inequality

Hence $D(f) = [-10, 10]$. ■

Solution to 18. We have $f(x) = \sqrt{x+8}$ and hence $f(6) = \sqrt{6+8} = \sqrt{14}$. ■

Solution to 19. To find the x-intercepts, set $f(x) = 0$.

$$\begin{aligned} \frac{x^2-4}{x+1} = 0 \Leftrightarrow x^2 - 4 &= 0. \\ \Leftrightarrow x^2 &= 4 \\ \Leftrightarrow x &= \pm 2. \end{aligned}$$

To find the y-intercept, set $x = 0$. $f(0) = \dfrac{0^2 - 4}{0 + 1} = -4$.

■

Solution to 20. We use the quadratic formula to find all the zeros of $f(x) = 3x^2 - 6x + 2$. Here $a = 3$, $b = -6$, and $c = 2$.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\begin{aligned} x &= \frac{-(-6) \pm \sqrt{(-6)^2 - 4(3)(2)}}{2(3)} \\ &= \frac{6 \pm \sqrt{36 - 24}}{6} \\ &= \frac{6 \pm \sqrt{12}}{6}. \end{aligned}$$

■