Honors PreCalculus 2022-23
PreCalc Basics Test

Name: Solution Key

score_____

1. If $f(x)$ is a linear function $f(2)=1$ and $f(4)=-2$, then $f(x)=$

a) $f(x)=-\frac{3}{2}x+4$ b) $f(x)=\frac{3}{2}x-2$ c) $f(x)=-\frac{3}{2}x+2$

d) $f(x)=\frac{3}{2}x-4$ e) $f(x)=-\frac{2}{3}x+\frac{7}{3}$

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

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2. Give the approximate location of a relative maximum point for the function $f(x)=3x^3+5x^2-3x$.

a) $(-1.357,\ 5.779)$ b) $(0.2457,\ -0.3908)$ c) $(-1.357,\ 5.713)$

d) $(0.2457,\ -0.3216)$ e) $(-1.357,\ -0.3908)$

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3. Find the polynomial of degree 3 whose zeros are $(-3,\ 0)$, $\left(\frac{3}{2},\ 0\right)$ and $(2,\ 0)$ and goes through $(1,\ -2)$.

a) $g(x)=(x+3)(2x-3)(x-2)$ b) $g(x)=-2(x+3)(2x-3)(x-2)$

c) $g(x)=\frac{1}{2}(x+3)(2x-3)(x-2)$ d) $g(x)=-\frac{1}{2}(x+3)(2x-3)(x-2)$

e) $g(x)=2(x+3)(2x-3)(x-2)$

$-2=a(1+3)(2(1)-3)(1-2)$

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4. Find an equation for the line perpendicular to $y = -2x + 3$ that contains the point $(-7, 0)$.

$y - 0 = \frac{1}{2}(x+7)$

a) $y = -2x - 7$ b) $y = \frac{1}{2}x - 7$ c) $y = -2x - 14$

d) $y = \frac{1}{2}x + \frac{7}{2}$ e) $y = \frac{1}{2}x - \frac{7}{2}$

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5. Given this sign pattern

y	$-$	0	$-$	0	$+$	0	$-$
x		-5		0		7	

;, which of the following **might** be the equation of $y = f(x)$?

$-(x+5)^2 \times (x-7)$

$(x+5)^{\text{EVEN}} \times^{\text{ODD}} (7-x)$

a) $f(x) = x(x+5)(x-7)$
b) $f(x) = x(x+5)^2(x-7)$
c) $f(x) = x(x+5)(7-x)$
d) $f(x) = x^3(x+5)^2(7-x)$
e) $f(x) = -x^3(x+5)^2(7-x)$

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6. Find the remainder when $y = 48x^3 - 72x^2 + \cancel{45}$ $9/4$ **is divided by** $4x - 3$.

a) 0 b) 27 c) -27 d) 18 e) -18

$3/4 \,|\, 48 \quad -72 \quad 0 \quad \cancel{45}\ 9/4 = \frac{\cancel{150}}{8}$

$36 \quad -27 \quad -\frac{81}{4}$

$48 \quad -36 \quad -27 \quad \frac{99}{4} \quad -\frac{72}{4} = -18$

7. Solve $\left(x^2+3x-2\right)\left(x+5\right)\geq 0$.

a) $\left[-5,\ -3.56\right]$ b) $\left[0.56,\ \infty\right)$ c) $\left[-3.56,\ 0.56\right]$

d) $\left[-5,\ -3.56\right]\cup\left[0.56,\ \infty\right)$ e) None of these

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Round to 3 decimal places. **score**_____

Show all work.

1. Use your graphing calculator to find **and sketch** a complete graph of $f(x) = -x^4 + 3x^3 + 4x^2 - 8x - 3$. State the window used, find the zeros, and the extreme points.

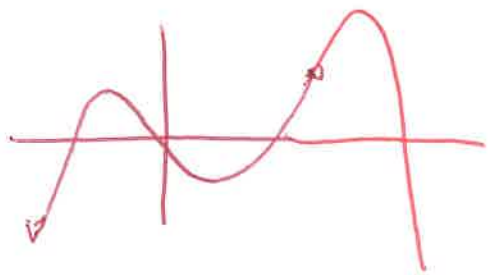
Window: $x \in [-4.7, 4.7]$ $y \in [-10, 15]$

Zeros: $(-1.659, 0)$ $(-.355, 0)$ $(1.585, 0)$ $(3.490, 0)$

Extreme Points: $(-1.121, 5.189)$

$(2.715, 10.469)$

$(.657, -5.869)$



2. Find the zeros of $y = 21x^4 + 47x^3 - 59x^2 - 27x + 18$ by calculator and prove it by synthetic division.

-3	21	47	-59	-27	18
		-63	48	33	-18
	21	-16	-11	6	0

$(-3, 0)$

$(1, 0)$

$(.429, 0)$

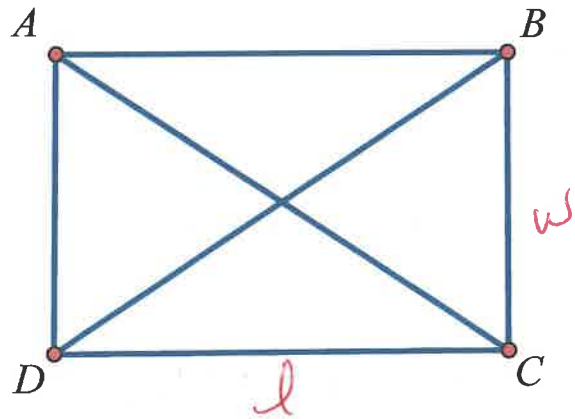
$(-.667, 0)$

1	21	-16	-11	6
		21	5	-6
	21	5	-6	0

$(x+3)(x-1)(21x^2+5x-6) = 0$

$x = -3, 1,$ $x = \dfrac{-5 \pm \sqrt{25 - 4(21)(-6)}}{2(21)} = \begin{cases} .429 \\ -.667 \end{cases}$

3. A field with an area equal to 2000 square yards in partitioned as below.



[NB. *AC* and *BD* are hypotenuses the right triangles that comprise half the field.]

a. State the equation needed to minimize the amount of fencing to be used.

$$F = 2l + 2w + 2\sqrt{l^2 + w^2}$$

b. State the secondary equation needed to eliminate the extra variable.

$$lw = 2000$$

c. Eliminate the extra variable in the equation needed to minimize the amount of fencing.

$$F = 2l + 2\left(\frac{2000}{l}\right) + 2\sqrt{l^2 + \left(\frac{2000}{l}\right)^2}$$

d. Find the minimum amount of fencing.

min (44.721, 305.377)

MIN FENCING = 305.377 YARDS

4. Use synthetic division to find $f\left(-\frac{1}{5}\right)$ if $f(x)=10x^3-5x+3$.

$$\begin{array}{r|rrrr} -\frac{1}{5} & 10 & 0 & -5 & 3 \\ & & -2 & \frac{2}{5} & +.92 \\ \hline & 10 & -2 & -4.6 & \cancel{2.08}\ 3.92 \end{array}$$

$f\left(-\frac{1}{5}\right) = \cancel{2.08}\ 3.92$

5. Find an inequality that has this sign pattern and solution:

$f(x)$	$-$	0	$+$	0	$+$	0	$-$
x		-4		$\frac{1}{3}$		3	

and $x \in \left(-4, \frac{1}{3}\right) \cup \left(\frac{1}{3}, 3\right)$

$-(x+4)(3x-1)^2(x-3) > 0$

6. Show the sign patterns for

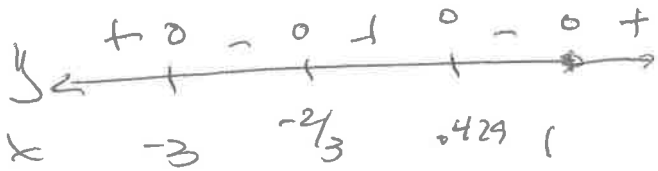
$y = x^3(x-5)^3(x+1)^2$

y	+	0	+	0	−	0	+
x		−1		0		5	

$y = -4(x-2)^2(x+5)(x+1)^2$

y	+	0	−	0	−	0	−
x		−5		−1		2	

7. Show the sign pattern and solve $21x^4 + 47x^3 - 59x^2 - 27x + 18 < 0$. (Note: This is the polynomial from #2 above)

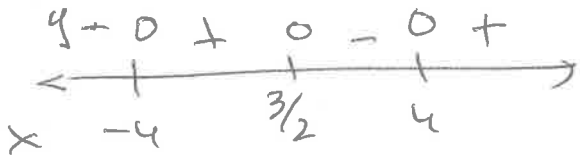


$x \in (-3, -2/3) \cup (.429, 1)$

8. Show the sign pattern and solve $2x^3 - 3x^2 - 32x + 48 \geq 0$

$x^2(2x-3) - 16(2x-3)$

$(x+4)(x-4)(2x-3) \geq 0 \to +$



$x \in [-4, 3/2] \cup [4, \infty)$