PreCalculus ACC 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) $f(x) = -\frac{2}{3}x + \frac{7}{3}$

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

$y = a(x+3)(2x-3)(x-2)$

$-2 = a(4)(-1)(-1)$

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

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

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

~~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) $y = \frac{1}{2}x - \frac{7}{2}$

$0 = \frac{-7}{2} + b$

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5. Given this sign pattern

$$\begin{array}{c|ccccccc} y & - & 0 & - & 0 & + & 0 & - \\ x & & -5 & & 0 & & 7 & \end{array}$$

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

~~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 $y = 48x^3 - 72x^2 + \cancel{45}$ 2.25 is divided by $4x - 3$.

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

3/4	48	-72	0	2.25
		36	-27	-20.25
	48	-36	-27	-18

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

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

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

Y − 0 + 0 − 0 +

x −5 −3.56 0.56

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Round to 3 decimal places.

Show all work.

1. Use your graphing calculator to find **and sketch** a complete graph of $f(x)=8x^4-4x^3-20x^2-5x+4$. State the window used, find the zeros, and the extreme points.

Window: $x\in[-4.7 \; x \; 4.7]$ $y\in[-30, 0)$

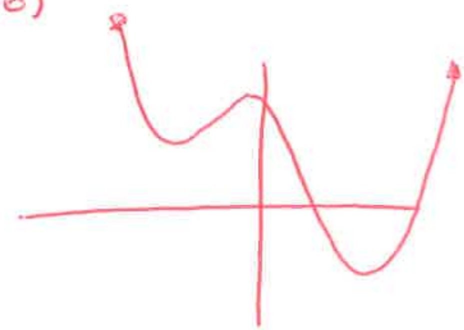
Zeros: $(.337, 0)$ $(1.909, 0)$

Extreme Points:

$(-.863, 4.28)$

$(1.370, -22.491)$

$(-.132, 4.323)$



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	∅

1	21	−16	−11	6
		21	5	−6
	21	5	−6	∅

$(x+3)(x-1)(3x+2)(7x-3)$

$(-3, 0)$ $(1, 0)$ $(-\frac{2}{3}, 0)$ $(\frac{3}{7}, 0)$

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

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

$f(-1/5) = 3.92$

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

y $+\ 0\ \ +\ 0\ \ -\ \ 0\ \ +$

x $-1\ \ \ 5/3\ \ \ 7$

and $x \in (-\infty, 1),\ (-1, 5/3),\ or\ (7, \infty)$

$(x+1)^2(3x-5)(x-7) \geq 0$

5. Show the sign patterns for
$y = x^3(x-5)^4(x+1)^2$

y $+\ 0\ -\ 0\ +\ 0\ +$

x $-1\ \ 0\ \ 5$

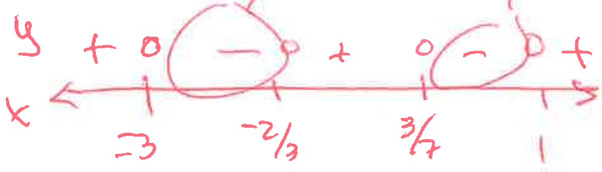
$y = -4(x-2)(x+5)^3(x+1)^2$

y $-\ 0\ +\ 0\ +\ 0\ -$

x $-5\ \ -1\ \ 2$

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

NEGATIVES



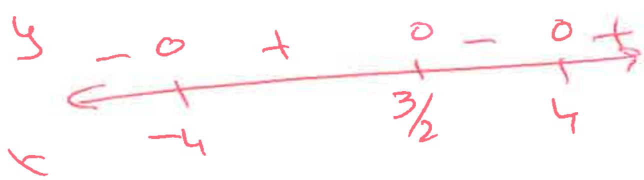
$x \in (-3, -\frac{2}{3})\ (\frac{3}{7}, 1)$

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

POSITIVES AND ZEROS

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

$(x-4)(x+4)(2x-3)$



$x \in [-4, \frac{3}{2}] \cup [4, \infty)$