Math 103 – Polynomials and Polynomial Functions - NEATNESS IS REQUIRED

All questions in problems 1-4 will deal with the same polynomial.
- SHOW ALL STEPS IN ALL PARTS OF THIS PROBLEM (<u>even if they are exactly the same as the steps on another part of the problem</u>)
- In each part: CIRCLE THE ANSWERS
- If you have been instructed to solve graphically:
  - INDICATE YOUR CHOICES OF Y1 and Y2; you MUST SHOW THE GRAPH ON THE PAPER
  - LABEL THE FUNCTIONS
  - LABELIMPORTANT FEATURES (NUMBERS) IN THE GRAPH
  - CIRCLE THE ANSWERS

1) Factor the polynomial $2x^2 + x - 15$

$$2x^2 + x - 15 = (2x - 5)(x + 3)$$

2) Solve the equation $\qquad\qquad 2x^2 + x = 15$

$$2x^2 + x - 15 = 0$$
$$(2x - 5)(x + 3) = 0$$
$$2x - 5 = 0 \ldots or \ldots x + 3 = 0$$
$$x = 5/2 \ldots or \ldots x = -3$$

3) Use algebra to find the x-intercepts of the polynomial function
$$f(x) = 2x^2 + x - 15$$

$$If \ldots y = 0 \ldots x = ?$$

$$2x^2 + x - 15 = 0$$
$$(2x - 5)(x + 3) = 0$$
$$2x - 5 = 0 \ldots or \ldots x + 3 = 0$$
$$x = 5/2 \ldots or \ldots x = -3$$

1

4) Given the polynomial function $f(x) = 2x^2 + x - 15$

a) Give the domain of f(x)

What numbers can you put in place of x to get real number answers for y?
What are the x-coordinates of all the points on the graph of f(x)?
DOMAIN IS ALL REAL NUMBERS

b) Use a **graphical approach** to find the zeros. Show graph and labels.

$f(x) = 2x^2 + x - 15$

If...y=0...x=?

2x²+x−15=0
Y1=2x²+x−15
Y2=0

Zero
X=-3   Y=0

Zero
X=2.5   Y=0

The zeroes are x = -3, and x = 2.5

c) Use the calculator to find $f(-5)$

If...x=−5...y=?

f(x)=2x²+x−15
f(−5)=2(−5)²+(−5)−15=30

NOW WITH THE CALCULATOR:

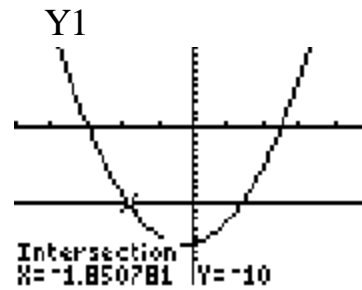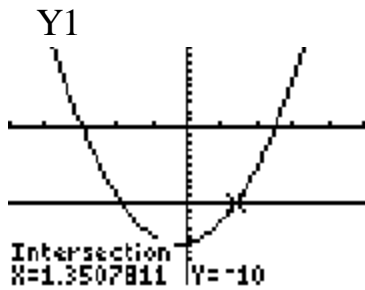d) Use a **graphical approach** to solve $f(x) = -10$
Round answers to 3 decimal places

*If...y=−10...x=?*

$$2x^2 + x - 15 = -10$$
$$Y1 = 2x^2 + x - 15$$
$$Y2 = -10$$

Y1   Y1

Intersection   Intersection
X=1.3507811 Y=-10   X=-1.850781 Y=-10

The solutions to the equation are the x-coordinates of the point of intersection

X=1.3507811 or x = -1.850781

e) What is the range of the function? What do you need to find out in order to answer this question? Write answer with inequality and interval notation. Label this important feature on the graph shown on part (b).

Y1


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Minimum
X=-.2500015  Y=-15.125
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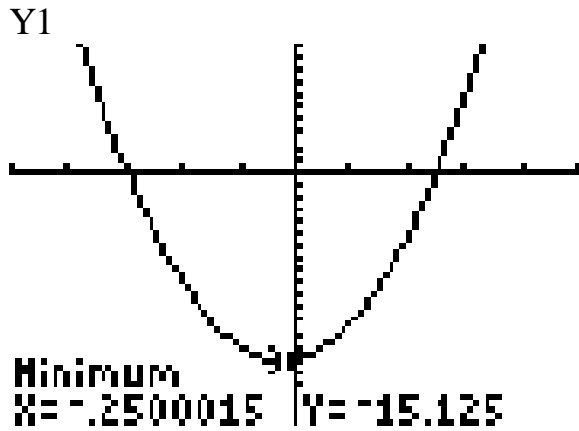
The coordinates of the vertex are (-.25, -15.125)

The range is
> y = -15.125 which is the same as [-15.125, 8)

5) Use a **graphical approach** to solve $2x^2 + x - 15 = 2x + 5$
Write your choices of Y1 and Y2 using the equation <u>as it is given</u>. Do not manipulate the
equation; that is, do not move terms around. Round answers to 3 decimal places

To solve $\qquad$ $2x^2 + x - 15 = 2x + 5$ $\qquad$ graphically,

we need to find the x-coordinate of the point of
intersection. Let, the left hand side be Y1 and the right
hand side be Y2

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Plot1 Plot2 Plot3
\Y1■2X²+X-15
\Y2■2X+5
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
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Y1

Y2

Intersection
X=-2.922144 Y=-.8442888

Y1

Y2

Intersection
X=3.4221444 Y=11.844289
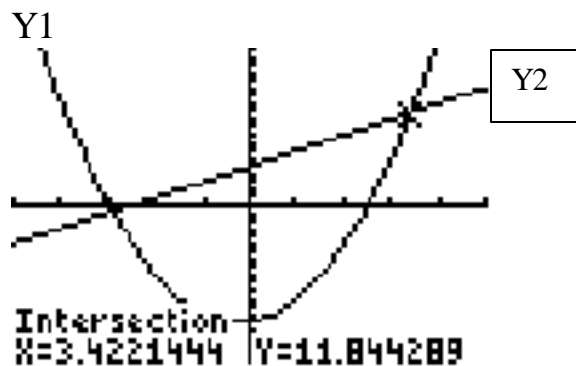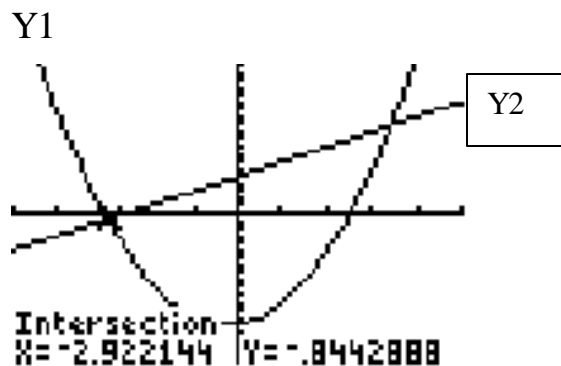
Solutions x = -2.922 or x = 3.422

6) USE A GRAPH TO FACTOR the polynomial of problem number 68 on page 391.
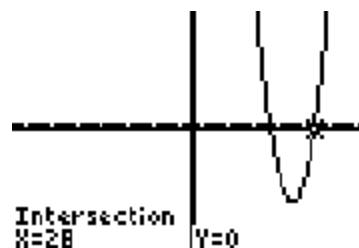Write the polynomial in factored form.

Factor $\qquad x^2-46x+504$

We set $\quad x^2-46x+504=0$

Let the left hand side be Y1 and the right hand side be Y2

We'll find the x-coordinate of the point of intersection
which is the same as the zeroes of the function

$x=18.....or.....x=28$
$x-18=0....or...x-28=0$

The factors of the polynomial are (x-18) and (x-28)

The factorization of the polynomial is
$x^2-46x+504=(x-18)(x-28)$