Unit 2 Assessment

Your school loop grades follows this piece-wise defined curve. Let the total points earned in this question be x, and the school loop grades is f(x), then

$$f(x)=\begin{cases} 2.5x\% & ,x\le 40 \\ \left[100+\frac{1}{8}(x-40)\right]\% & ,x>40 \end{cases}$$

1. (4 pts each, pick only 1)

Determine where in the domain will $f(x)$ be decreasing? (use interval notation to write your answers.)

(Following a, and b 2 separate questions)

(a) $f(x)=|x-3|-\frac{1}{2}|x+4|$

(b) $f(x)=|2x+2|-|2x-3|$

2. (4 points each, pick only 1)

For each pair of function $f(x)$ and $g(x)$, find the intersection of $f(x)$ and $g(x)$ algebraically.

(Following a and b are 2 separate questions)

a) $f(x)=|x+2|-1$, $g(x)=x^2+1$

b) $f(x)=\frac{1}{x-2}$, $g(x)=x-\frac{1}{2}$

3. (8 points)

Given $f(x)=-\frac{1}{4}(x-2)^2+2$ and $g(x)=-2x+b$, if $f(x)$ and $g(x)$ intersect at exactly one point.

(a) Find the variable b

(b) Find a line that is perpendicular to $g(x)$ and passes through the point of tangency between $f(x)$ and $g(x)$.

4. (4 points each, pick only 1)

Assume z_1, z_2 are complex numbers, and a,b are real numbers if

(Following a and b are 2 separate questions)

a) $z_1=2a-2bi,$
$z_2=(a+b)-4bi,$
$z_1+z_2=-2+3i$

b) $z_1=a-bi,$
$z_2=(a+b)+ai,$
$z_1+z_2=3-2i$

Find $\left|\frac{z_2}{z_1}\right|$

5. (8 points each, pick only 1)

Find all possible rational zeros of $f(x)$.

(Following a, and b are 2 separate questions)

a) $f(x)=x^4-3x^2-4$

b) $f(x)=4x^4+16x^3+15x^2-4x-4$

6. (8 points)

Given $f(x)=-\frac{1}{x+2}, x>-2$, if $f^{-1}(x+1)=g(x)-2$,

(a) find the domain and range of $g^{-1}(x)$

(b) graph $g^{-1}(x)$

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7. (4 points each, pick only 1)

Assume $f(x)$ is a 4th degree polynomial and all coefficients of $f(x)$ are real numbers. If zeros of $f(x)$ are located on the complex plane as shown, and the y-intercept of $f(x)$ are also given, Find

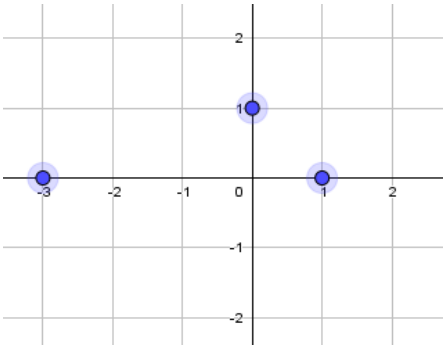
1) Find f(x) (in general form)

2) What is the reminder if $f(x) \div (x-2)$.

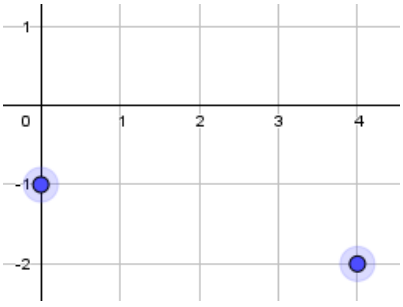
where

(Following a and b are 2 separate questions)

(a) $f(0)=6$ and known zeros are as shown in the complex plane



(b) $f(0)=-10$ and known zeros are shown in the complex plane



8. (8 points each, pick only 1)

Consider the following polynomial,

(Following a and b are 2 separate questions)

a) $f(x)=(x-2)(x^2-9)-(x^2-9)$

b) $f(x)=(x+3)(2x^2+x-6)-x^2(x^2+5x+6)$

1) Describe the ending behavior of the polynomial

2) Describe the behavior of the polynomial around its zero.

3) Sketch $f(x)$, based on the results from 1) and 2)

9. (8 points each, pick 1 only)

Sketch the following rational function

(Following a, b and c are 3 separate questions)

a) $f(x)=\dfrac{x-2}{x^2+2}$

b) $f(x)=\dfrac{x^2-x-2}{2x^2-3x+1}$

c) $f(x)=\dfrac{-2x^2+3x}{x+1}$

also find

(1) the possible hole, (2) possible x and y intercepts (3) domain (in interval notation), and (4)all asymptotes.