Calculator NOT Permitted

Review For Quiz 4

FREE RESPONSE

Consider the polynomial functions, $f(x)$ and $g(x)$, below to answer the following questions.

$$f(x) = 3x^3 - 2x^2 + kx - 3 \qquad g(x) = 2x^3 - 5x^2 - 37x + 60$$

a. When $f(x)$ is divided by $(x - 5)$, the remainder is 4. Find the value of k.

$x = 5$

1

$5\,|\,3 \quad -2 \quad k \quad -3$

$\quad\quad 15 \quad 65 \quad (5k+325)$

$3 \quad 13 \quad (k+65) \quad |\ 5k+322$

Remainder = 4

2

$5k + 322 = 4$

$5k = -318$

$k = \frac{-318}{5}$

$R = 0$

b. Find the value of k if $(x + 3)$ is a factor of $f(x)$. Show your work.

$x = -3$

1

$-3\,|\,3 \quad -2 \quad k \quad -3$

$\quad\quad -9 \quad 33 \quad -3k-99$

$3 \quad -11 \quad (k+33) \quad |\ -3k-102$

$R = 0$

2

$-3k - 102 = 0$

$-102 = 3k$

$-34 = k$

c. The function, $g(x)$, has a zero of $x = -4$ that has a multiplicity of 1. Rewrite $g(x)$ in completely factored form.

$(x+4)$ is a factor

$$g(x) = 2x^3 - 5x^2 - 37x + 60$$

① $-4 \mid 2 \quad -5 \quad -37 \quad 60$

$\quad\quad\quad -8 \quad 52 \quad -60$

$\quad 2 \quad -13 \quad 15 \quad 0$

② $g(x) = (x+4)(2x^2 - 13x + 15)$

③ $2x^2 - 13x + 15$

$= 2x^2 - 10x - 3x + 15$

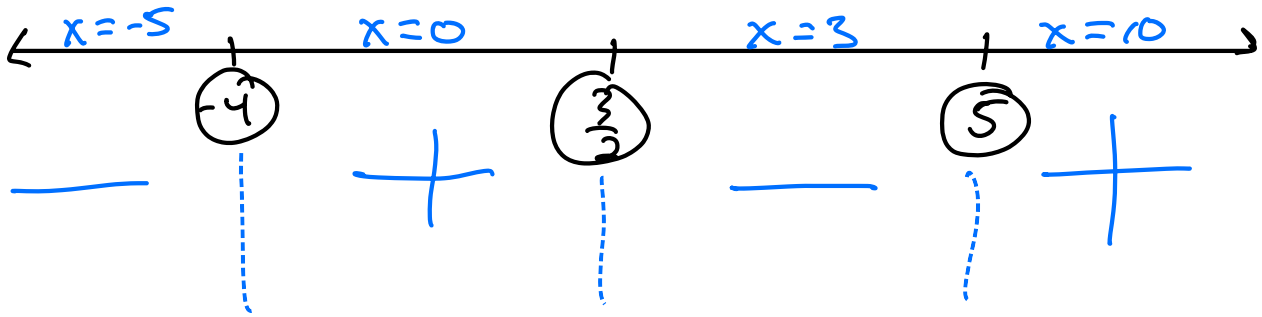
$= 2x(x-5) - 3(x-5)$

$= (x-5)(2x-3)$

④ $g(x) = (x+4)(x-5)(2x-3)$

d. Find the value(s) of x which make $g(x) \geq 0$. Show the number line sign analysis that leads to your solution.

$$(x+4)(x-5)(2x-3) \geq 0$$



$g(x) \geq 0$ on $[-4, \frac{3}{2}] \cup [5, \infty)$

MULTIPLE CHOICE

1. How many times is $(x - 1)$ a factor of $g(x) = x^4 - 4x^3 + 6x^2 - 4x + 1$?

A. 4
B. 3
C. 2
D. 1
E. 0
F. Cannot be determined

$x=1$

1	1	-4	6	-4	1
		1	-3	3	-1
1	1	-3	3	-1	0
		1	-2	1	
1	1	-2	1	0	
		1	-1		
1	1	-1	0		
		1			
1	1	0			

2. Which of the following statements is/are true about the function $f(x) = 2x^3 + 17x^2 + 31x - 20$?

False I. $(x - 4)$ is a factor of $f(x)$. F

True II. The graph of $f(x)$ crosses the x – axis at $x = -5$.

True III. $x = ½$ is a root of $f(x)$.

4	2	17	31	-20
		8	100	524
	2	25	131	504

T

-5	2	17	31	-20
		-10	-35	20
	2	7	-4	0

A. I and II only
B. I only
C. III only
D. II and III only
E. I, II, and III

½	2	17	31	-20
		1	9	20
	2	18	40	

$x=-3$

$R=0$

3. What value of k makes the factor $(x + 3)$ a factor of the function $f(x) = x^3 + 2x^2 + 19x + k$?

A. 21
B. -66
C. 1
D. –21
E. 66
F. -1

-3	1	2	19	K
		-3	3	-66
	1	-1	22	K-66

$K - 66 = 0$

$K = 66$

4. If $(x - 2)$ is a factor of $f(x) = 5x^3 + 26x^2 - 65x - 14$, what is $f(x)$ written in completely factored form?

A. $f(x) = (x - 2)(5x + 1)(x + 7)$
B. $f(x) = (x - 2)(5x - 1)(x - 7)$
C. $f(x) = (x - 2)(5x - 7)(x - 1)$
D. $f(x) = (x - 2)(5x + 1)(x - 7)$
E. $f(x) = (x - 2)(5x - 1)(x + 7)$

$(x-2)$

2 | 5 | 26 | −65 | −14
| | 10 | 72 | 14
| 5 | 36 | 7 | 0

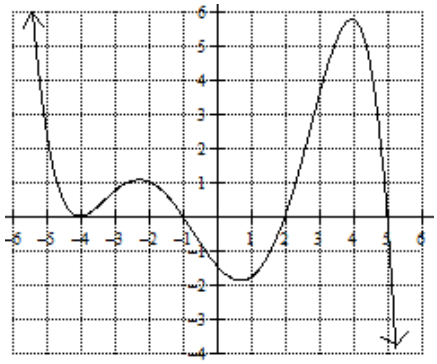
$5x^2 + 36x + 7$

$5x^2 + 35x + 1x + 7$

$5x(x+7) + 1(x+7)$

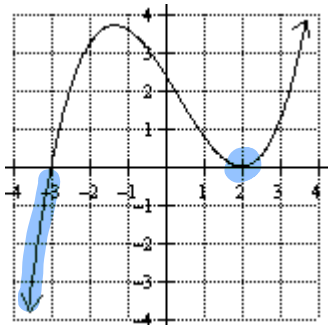
$(x+7)(5x+1)$

5. Which of the following statements is ***false*** about the function to the right?



A. The multiplicity of the root $x = -1$ is even. False
B. The function graphed is odd degree. True
C. As $x \to -\infty$, then $f(x) \to \infty$. True
D. As $x \to \infty$, then $f(x) \to -\infty$. True
E. The domain and range of $f(x)$ are $(-\infty, \infty)$. True

6. Given the graph of the function $g(x)$ pictured to the right, for what value(s) of x is $g(x) \leq 0$?



A. $(-3, 2) \cup (2, \infty)$
B. $(-\infty, \infty)$
C. $(-3, \infty)$
D. $x = 2$ and $(-\infty, -3)$
E. $x = 2$ and $(-\infty, -3]$

7. Solve the polynomial inequality: $(x-1)^2(x+1)(x-2) > 0$

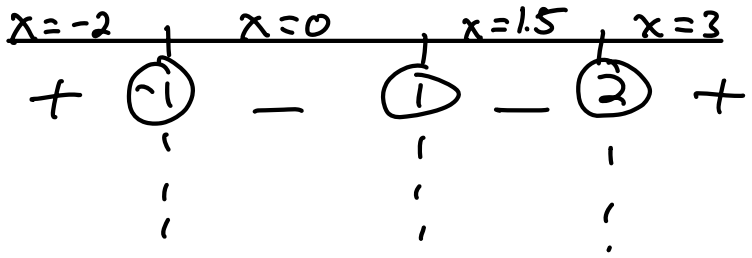
A. $(-\infty, -1) \cup (2, \infty)$

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

C. $(-1, 2)$

D. $[-1, 2]$

E. $(-\infty, -1] \cup [1, 2]$



Degree = 4

A table of values for a quartic polynomial function is shown below. Additionally, the function is such that there are only three distinct zeros, all of which are integer values.

mult = 1

mult = 2

x	−4	−2	−1	0	1	2	3	4
$p(x)$	10	-2	0	6	3	1	0	2

Zero | Zero | y-int

Zero between (mult = 1)

8. If c is the constant in the equation of $p(x)$, then which of the following is the value of c?

A. $c = -1$

B. $c = 1$

C. $c = 4$

D. $c = 6$

y-int = constant

E. The value of c cannot be determined.

9. Which of the following statements is/are true about $p(x)$?

I. In factored form, $(x - 3)$ is a factor of $p(x)$ twice. ✓

II. $x = -1$ is a zero whose multiplicity is 2. ✗

III. Two of the zeros of $p(x)$ has a multiplicity of 1. ✓

A. I only

B. I and II only

C. II and III only

D. II only

I and III