Math Chapter 3 Problems$_{S}ilvaAndrew$

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1 Power Functions and Polynomial Functions

Find the long run behavior.

2. $f(x) = x^6$

A.) f(x) will approach $+\infty$ as x approaches ∞

B.) f(x) will approach $+\infty$ as x approaches $-\infty$ because when you square a negative by 6 or any even number it will always equal a positive number.

I asked questions on this one in class to clarify what I was confused on. I was not sure how to start the problem. I thought we were solving something but I realized we were finding something rather then solving for it.

Find the Degree a Leading Coefficient of the Polynomial

16. $(3x + 1)(x + 1)(4x + 3)$

$(3x^2 + 3x + 1x + 1)(4x + 3)$

$12x^3 + 12x^2 + 4x^2 + 4x + 9x^2 + 9x + 3x + 3$

$12x^3 + 12x^2 + 4x^2 + 9x^2 + 9x + 3x + 3$

$12x^3 + 25x^2 + 14x + 3$

Degree: 3

Leading Coefficient: 12

I found this one easy because I know what the leading coefficient and degree of a function are. So its just having to factor it into the polynomial that was the part I had to take my time with.

Find the Long Run Behavior

18. $6x^5 - 2x^4 + x^2 + 3$

A.) As x approaches $+\infty$ the function will approach $+\infty$ because the Leading coefficient is positive .

B.) As x approaches $-\infty$ the function will approach $-\infty$, this is because the degree is an odd number.

I struggled on this one but I ended up figuring it out. Similar to the first one I was just confused because it was a full function.

22. What is the maximum number of x-intercepts and turning points of a degree of 8?

To find the number of turning points you do the degree (n) - 1.

So in this case, 8 - 1 is 7 turning points.

This means that it must cross the x-axis at least 8 times. Which means 8 x-intercepts.

I found this one easy. I understood how to find the number of turning points. Which then helped me to understand that before the first point is one x intercept, then after every turning point, which in this case there is 7, there is on x intercept. Which means there is a max of 8 x intercepts.

Find the Vertical and Horizontal intercepts of the Function.

33. $g(n) = -2(3n-1)(2n+1)$

Vertical:

$g(0) = -2(3(0)-1)(2(0)+1)$

$g(0) = -2(0-1)(0+1)$

$g(0) = -2(-1)(1)$

$g(0) = 2(1)$

$g(0) = 2$

For g(n) n = $\frac{1}{3}$ and -$\frac{1}{2}$ get products equal to to zero. Therefor the Horizontal Intercepts are ($\frac{1}{3}$, 0) and (-$\frac{1}{2}$, 0)

I had to look this one up. I found the vertical Intercept, but I did not know how to find the x intercept. I realized that you plug in the x vlaue and look for the products that are 0.

2 Quadratic Functions

Find the Vertex the Vertical Intercept and the Horizontal Intercepts of the function.

7. $2x^2 + 10x + 12$

Vertex:

x= $\frac{10}{2(2)} = -\frac{10}{4} = -\frac{5}{2}$

$2(-\frac{10}{4}^2 + 10(-\frac{10}{4}) + 12$

$2(\frac{100}{16} + 10(-\frac{10}{4} + 12$

$\frac{2}{1}x\frac{100}{16} + \frac{10}{1}x - \frac{10}{4} + 12$

$\frac{100}{8} + -\frac{50}{2} + 12$

$\frac{100}{8} + -\frac{200}{8} + 12$

$-\frac{100}{8} + \frac{12}{1}$

$-\frac{100}{8} + \frac{96}{8} = -\frac{4}{8} = -\frac{1}{2}$

$2x^2 + 10x + 12 = 0$

Horizontal Intercepts: (-3,0) and (-2,0)

Vertical Intercept: (0,12)

The part I found the most confusing was finding the vertex. After taking my time with it I figured it out. I realized you need to use the formula $\frac{-b}{2a}$. I thought finding the x and y intercepts would be easy but I could not figure out how to factor 10x + 12. Nothing adds up to 10 and multiples to 12. So I had to look up the solution.

Rewrite the quadratic formula into vertex form

16. $k(x) = 3x^2 - 6x - 9$

x= -$\frac{-6}{2(3)} = -\frac{-6}{6} = 1$

$3(1)^2 - 6(1) - 9$

$3(1) - 6 - 9$
$3 - 6 - 9$
$-3 - 9$
-12
Vertex: (6,-12)
Vertex formula: $3(x+1)^2 + 12$

I found this one easy because you just need to find the vertex and then plug it into the vertex formula.

Write an equation for a quadratic with the given features.

25. Vertex at (-3,2) and passing through (3,-2)
$\frac{-b}{2a} = -3$
$2a * \frac{-b}{2a} = -3 * 2a$
$-b = -3(2a)$
$-b = -6a$
$b = 6a$
$y = ax^2 + 6ax + c$
$c = 2 + 9a$
$y = ax^2 + 6ax + 2 + 9a$
$-2 = 9a + 18a + 2 + 9a = \frac{-1}{9}$
$y = -\frac{1}{9}x^2 - \frac{2}{3}x + 1$

I understood how to find b, but I had trouble finding a and c. I had to look up the solution because I was not sure how to calculate for c and you need c to find a. I am still confused on how to find c after looking at the solution.

29. The height of the ball thrown in the air is $h(x) = \frac{1}{2}x^2 + 6x + 3$, where x is the horizontal distance in feet from the point at which the ball is thrown.
A.) How high the ball when it was thrown.
$h(0) = \frac{1}{2}^2 + 6(0) + 3$
$h(0) = \frac{1}{2}(0) + 0 + 3$
$h(0) = 0 + 0 + 3 = 3$ feet.

I found this part easy. It is just plugging 0 in for x to figure out the height of where the ball was thrown

B.) What is the Maximum height of the ball.
$\frac{-b}{2a} = -\frac{6}{2(\frac{1}{2})} = -\frac{6}{1} = -6$
$h(6) = \frac{1}{2}(-6)^2 + 6(-6) + 3$
$h(6) = \frac{1}{2}(36) + 36 + 3$
$h(6) = 18 + 36 + 3 = 57$ feet.

I thought I got the second part right but after comparing with the solution I realized I am wrong. i can not tell where I went wrong.

C. When does the ball hit the ground?
$x = \frac{-6 \pm \sqrt{6 - 4(\frac{1}{2})(3)}}{2\frac{1}{2}}$
$x = \frac{-6 \pm \sqrt{6-6}}{1}$
$x = \frac{-6 \pm \sqrt{36-6}}{1}$
$x = \frac{-6 \pm \sqrt{30}}{1}$

$\frac{-6+\sqrt{30}}{1} = -6 + 5.48 = 0.523$

For the last part I had no clue how to solve it. After looking at the solution I still do not know how to solve it. I solved the quadratic formula but it game me two answers not one. I relaized there can only be the positive answer but my answer is still incorrect.

32. How Big a piece of card board is needed?

$x = \frac{-0\pm\sqrt{0^2-4(6)(2700}}{2(6)}$

$\frac{-0\pm\sqrt{0^2-4(6)(2700)}}{12}$

$\frac{-0\pm\sqrt{4(5)(2700)}}{12}$

$\frac{-0\pm\sqrt{64{,}800}}{12} = 21.21$

I had to look up the solution for this one. I asked in class what b was and you said b would be 0 if there is not b in the trinomial. However I feel as those my answer is wrong. I plug the information into the quadratic formula but it still incorrect.

3 Graphs of Polynomial Functions

Sole each Inequality

19. $(x-3)(x-2)^2 > 0$

$x-3)(x-2)(x-2)$

$x^2 - 3x + 6(x-2)$

$x^3 - 7x^2 + 16x - 12 = 0$

$(x-2) = x = 2$

$(x-3) = x = 3$

so, $x > 3$

I found this one easy because it is just solving for the inequality. However, i did have trouble when I was factoring. i feel as though I was never fulling taught how to factor when I was younger. When ever I come across problems I have to factor I always have a tough time with them.

Write an equation for a polynomial.

33. $f(x) = a(x-3)^2(x-1)^2(x+3)$

$9 = (0-3)^2(0-1)^2(0+3)$

$x = \frac{1}{3}(x-3)^2(x-1)^2(x+3)$

I had to look up the solution to this one because I had no clue how to start it. After looking at the solution I remembered that the degree means how many x intercepts Which makes me realize the multiplicity is how many times it crosses at that point. that is why the (x-3) and (x-1) are squared. I'm still confused on how to find a as well as what the final answer is.

52. What are the dimensions of such a rectangle?

$y = 16 - x^4$

$2x(16 - x^4)$

$32x - 2x^5 = 0$

$32 - 2x^4 = 0$

$-2x^4 = -32$
$x^4 = 16$
$x = 2$
$2(2)(16) - 2^4$
$2(2)(16 - 16)$
$4(16 - 16)$
$64 - 64 = 0$
2xy= A
$2(2)(16 - 2^4)$
$4(16 - 16)$
A = 0

I had to look up the answer to this one. I wasn't sure how to start. After I saw that $(16 - x^4)$ is the y. It made the problem seem a bit easier. However, I know my answer is wrong because it comes out to 0 and it can't be 0. But every way I try to do the problem it just doesn't seem right.

4 Factor Theorem and Remainder Theorem

Find the real Zeros and Factor the polynomial.

25. $x^3 + 2x^2 - 3x - 6$, $c = -2$

I have no idea where to begin with this one. I have stated at it for 30 minutes trying to figure it out. Nothing in the manual and videos is clicking for me. I understand $x - (-2)$ but I don't know what to do with that.

27. $4x^4 - 28x^3 + 61x^2 - 42x + 9$, c = $\frac{1}{2} is a zero of multiplicity 2$

Smae thing as the last one, I have looked at the manual and and videos. I looked at the solutions and I still dont know how to solve it.

5 Real Zeros of Polynomials

Use Cauchy's Bound to find the all real zeros then use Rational Roots Theorem to make a list of possible rational zeros.

1. $f(x) = x^3 - 2x^2 - 5x + 6$
$k : \pm 1$
$h : \pm 1, \pm 2, \pm 3, \pm 6$
$|\frac{1}{1}|, |\frac{-2}{1}|, |\frac{-5}{1}|, |\frac{6}{1}|$ = 1, -2, -5, 6
Max[6, 1, -2, -5] = 6
Max $x + 1 = 7$ or [-7,7]
$\frac{h}{k} = |\frac{1}{1}|, |\frac{2}{1}|, |\frac{3}{1}|, |\frac{6}{1}|$ or
$\pm 1, \pm 2, \pm 3, \pm 6$

I had to look up the solution. however when I did it looked like the answer was not correct. I then took a break and returned to try again. I looked at a few videos on youtube and seem to have figured it out. However my answer is much different then the one given in the solution manual.

Find the real Zeros of Each polynomial.

13. $f(x) = x^4 - 9x^2 - 4x + 12$
$x(x^3 - 9x)4(-1 + 3) = 0$
$(x + 4)(x^3 - 9x)(-1x + 3) = 0$
$x + 4 = 0$
$x = -4$
$x^2 - 9 = 0$
$x^2 = 9$
$x = 3$
$-x + 3 = 0$
$-x = -3$
$x = 3$
Real Zeros are -4 and 3.

I found this one a little difficult. After doing the last one I feel as though I had a better understanding though. After watching videos on it I feel like I have a better understanding of a root of a polynomial. However I am still having a bit of difficulty factoring. I can do problem after problem but I can not retain the process of factoring.

6 Complex Zeros

Simplify each Expression

6. $\frac{4+\sqrt{-20}}{2}$
$2 + \sqrt{10}$
$2 + i\sqrt{5}$

I think the solution manual is out dated. I think I figured this one out but I looked at the solutions and noticed there was no section 3.6 -3.8. Also that sections 3.4 and 3.5 are not correctly matched with the refrenece text. However, I thought this one was easy. it was just simplfying the expression into a complex number. I thought I was correct. however I checked my answer with google and I saw that I was incorrect. i was missing the I at first. I know what the i means and where it comes from. I am just confused on working with square roots still.

Simplify each expression to a simple complex number.

19. $\frac{3+4i}{2} =$
$\frac{3}{2} + 2i$

I do not know if this is correct. I tried looking up the videos on youtube but i could find a problem similar to it. So i tried my best, thining you would just divid the 3 and 4 by 2.

25. $f(x) = x^2 - 4x + 13$
$k : \pm 1$
$h : \pm 1, \pm 13$
$\frac{h}{k} = |\pm \frac{1}{1}|, |\pm \frac{13}{1}|$
$So \pm 1, and \pm 13$

I have no clue where to go from here. I know you need to factor, but I dont have a clue what to do with the $\pm 1, \pm 13$ And there is no solution on the website to even try and guide myself.

7 Rational Functions

Find the horizontal intercept vertical intercept, the vertical asymptotes and the horizontal asymptotes.

5. $P(x) = \frac{2x-3}{x+4}$

Vertical Intercept: $\frac{2(0)-3}{0+4} = \frac{-3}{4}$

Vertical Asymptote: $x + 4 = 0 or x = -4$

Horizontal Asymptotes: $f(x) = \frac{2x-3}{x+4} = y = \frac{2}{1} = 2$

To get the horizontal Intercept set the function equal to 0 so,

$\frac{2x-3}{x+4} = 0 = \frac{3}{2}$

Vertical Intercept: $(0, \frac{-3}{4}$

Horizontal Intercept: $(\frac{3}{2}, 0)$

After finding videos online I was able to find the vert asymtotes and the horizontal asyemtotes. When I did that I thought the answers look fimilair so I checked the solutions manual. I realized it was under 3.4 solutions.

Write an equation for a rational function with the given characteristics.

19. Vertical asymptotes at x = 5 and x = 5 and x intercepts at (2,0) and (1,0) y intercept at (0,4).

$x + 1 = 0 = x = -1$

$x - 2 = 0 = x = 2$

$x - 5 = 0 = x = 5$

$x + 5 = 0 = x = -5$

$y = \frac{(0-2)(0+1)}{(0-5)(0+5)} = y = \frac{(-2)(1)}{(-5)(5)} = \frac{-2}{25}$

$y = 50 * \frac{(x-2)(x+1)}{(x-5)(x+5)}$

I had to look up the solution to this one. I got all the way until you had to mutiply the equation by 50, and that when I got confused. Looking back it makes sense be cause you need it reach up to 4. But I was just not sure how to do that. I did find it easy to find the roots though.

Find the Oblique Ayesmotote.

39. $f(x) = \frac{3x^2+4x}{x+2}$

Divide $3x^2 + 4$ by $x + 2$ to get $3x - 2$.

$f(x) = [3x - 2] + \frac{4}{x+2}$

$y = 3x - 2 = ObliqueAyesmtote.$

After watching a few youtube videos I think I figured it out. It was a little challenging because I've never done long division with polynomials but other than that I think I figured it out.

45.

A.) Write an equation for the concentration in the beaker.

$1 - \frac{(n+16}{n+20}$

B.) $1 - \frac{10+16}{10+20}$

$\frac{30}{30} - \frac{26}{30} = \frac{4}{30} or \frac{2}{15}$

C.) $-2n - 60 = n + 16$

$n = 19ml$

I really struggled with a lot of this chapter. I show up to most of the classes. I ask questions and ask for help but seem to still not be able to understand this. I know that this class is structured around helping us find out what we are confused about in a problem, but it just seems to lead me to be more confused. In most classes we only go over 2 or 3 problems at most. I feel as though that isn't sufficient seeing that we are given almost 30 problems in some cases. It leads us to have to teach ourselves most of the material. I do understand that college is about learning to take control and teach ourselves. However, I am in this class because I am not strong in math. I understand that Engineering is a math heavy major and I really need to learn the material. I am a strong problem solver, I just get confused when it comes to math because I get anxious that there could be so many possible answers to a simple problem if I make one mistake. I have a lot of homework in my other classes that it makes it difficult for me to find time to make office hours and find a tutor. I find that when we go over questions in class many are from the beginning of the chapter, which are much easier than the ones later on in the chapter.