

Semester 2 Review Chapters 5 and 6

State the maximum number of turns the graph of each function could make.

1)  $f(x) = x^4 + x^3 - 4x^2 + 2$  *1 less than degree = 3*

Is the function an odd degree function or an even degree function?

2)  $f(x) = -x^4 - 4x^3 - 4x^2 - x$  *4 -> even*

State the degree of the polynomial.

3)  $f(x) = x^4 - 3x^2 + 3$  *(4) quartic*

Name each polynomial by degree and number of terms.

4)  $4m^4$  *quartic monomial*      5)  $-4x^4 + 5x^3 + 10x$  *quartic poly of 4 terms.*

6)  $-9b^3 - 8b^2$  *cubic binomial*

Factor each.

7)  $x^3 - 9x^2 + 20x = 0$   
 $x(x^2 - 9x + 20) = 0$   
 $x(x-5)(x-4) = 0$   
 $x = 0, 5, 4$

8)  $x^4 - x = 0$   
 $x(x^3 - 1) = 0$   
 $x(x-1)(x^2 + x + 1) = 0$   
 $x = 0, 1$  *↑ use quad to solve*

9)  $(x^4 - x^3)(4x^2 + 4x) = 0$   
 $x^3(x-1) \cdot 4x(x+1) = 0$   
 $(x^3 - 4x)(x-1) = 0$   
 $x(x+2)(x-2)(x-1) = 0$

Find all roots.  
*zeros & intercepts x=0, 2, -2, 1*

10)  $x^4 - 14x^2 + 48 = 0$   
 $(x^2 - 8)(x^2 - 6) = 0$   
 $x^2 = 8$        $x^2 = 6$   
 $x = \pm 2\sqrt{2}$        $x = \pm \sqrt{6}$

11)  $x^4 - 4x^2 - 5 = 0$   
 $(x^2 - 5)(x^2 + 1) = 0$   
 $x^2 = 5$        $x^2 = -1$   
 $x = \pm\sqrt{5}$        $x = \pm i$

Divide using synthetic division.

12)  $(n^3 - 2n^2 - 52n - 24) \div (n + 6)$

*-6* | 1    -2    -52    -24  
       ↓    -6    48    24  
       ---  
       1    -8    -4    0 ✓

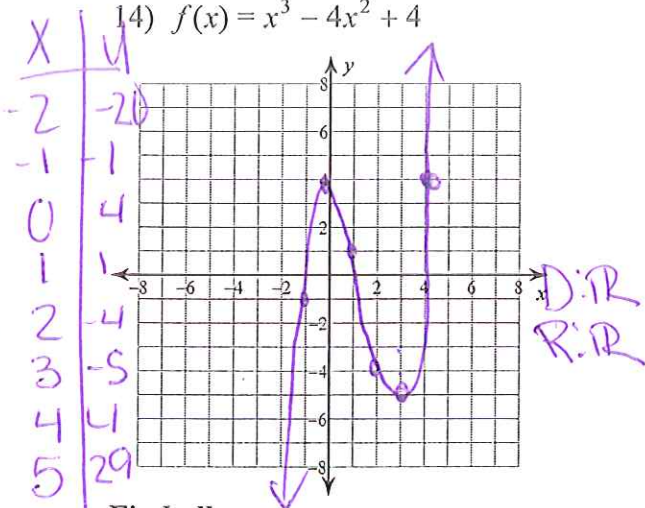
$(x^2 - 8x - 4)$  *↑ solve w/ quad.*

State the possible rational zeros for each function.

13)  $f(x) = 2x^3 + x^2 - 2x - 1$  *P*  
*P: ±1*  
*Q: ±1, ±2*  
 $\frac{P}{Q} \left[ \pm 1, \pm \frac{1}{2} \right]$

Sketch the graph of each function. State the domain and range.

14)  $f(x) = x^3 - 4x^2 + 4$



D:  $\mathbb{R}$   
R:  $\mathbb{R}$

Find all zeros.

16)  $f(x) = (2x^3 + 2x^2)(x + 5) + 5$

$2x^2(x+1) + 5(x+1)$   
 $(2x^2+5)(x+1)$

$x = -1$   
 $x = \frac{-5 \pm \sqrt{25}}{2} = \frac{-5 \pm 5}{2}$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

17)  $-2, 4, -3$

$(x+2)(x-4)(x+3)$   
 $(x^2-2x-8)(x+3)$

$x^3 - 2x^2 - 8x + 3x^2 - 6x - 24$   
 $x^3 + x^2 - 14x - 24$

State the zeros and their multiplicity. Will the graph bounce or pass through?

18)  $x(5x+1)^2(x+1)^3 = 0$

$x=0$  mult 1 pass  
 $x=-1/5$  mult 2 bounce  
 $x=-1$  mult 3 pass

Simplify. Your answer should contain only positive exponents.

19)  $4x^2 \cdot 4x^3$

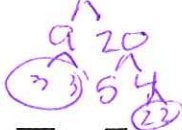
$16x^5$

20)  $\frac{(p^{-3})^2}{p^4 \cdot 2p^2}$

$\frac{p^{-6}}{2p^6} = \frac{1}{2p^{12}}$

Simplify.

21)  $-8\sqrt{180x}$



$-48\sqrt{5x}$

22)  $-3\sqrt[3]{250x^5y^4}$



$-15x\sqrt[3]{2x^2y^4}$

23)  $\sqrt{10}(2\sqrt{3} + \sqrt{5})$

$2\sqrt{30} + \sqrt{50}$

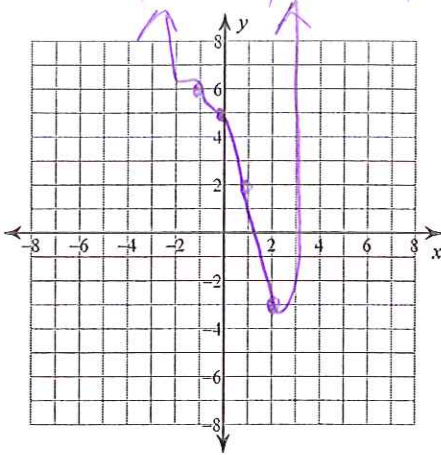
24)  $(2 - 5\sqrt{3})(3 + \sqrt{3})$

$6 + 2\sqrt{3} - 15\sqrt{3} - 5\sqrt{9}$

$6 - 13\sqrt{3} - 15$

$-9 - 13\sqrt{3}$

15)  $f(x) = x^4 - 2x^3 - 2x^2 + 5$



D:  $\mathbb{R}$   
R:  $y \geq -3$

$\sqrt{\quad}$	$\sqrt{\quad}$
-2	29
-1	6
0	5
1	2
2	-3
3	14

Solve each equation. Remember to check for extraneous solutions.

25)  $-2 = -6 + \sqrt{8k}$   
 $4 = \sqrt{8k}$   
 $16 = 8k$   
 $k = 2$

26)  $\sqrt{n-6} = \sqrt{24-n}$   
 $n-6 = 24-n$   
 $2n = 30$   
 $n = 15$  ✓

Write each expression in exponential form.

27)  $(\sqrt[3]{6b})^4$   
 $(6b)^{4/3}$

Simplify.

28)  $\frac{4\sqrt[3]{6}}{3\sqrt[3]{2}}$   
 $\frac{4\sqrt[3]{24}}{3\sqrt[3]{8}} = \frac{4\sqrt[3]{8 \cdot 3}}{3(2)} = \frac{8\sqrt[3]{3}}{6} = \frac{4\sqrt[3]{3}}{3}$

Solve each equation.

29)  $n^3 = 3125$   
 $\sqrt[3]{n^3} = \sqrt[3]{3125}$   
 $n = 125$  ✓

Perform the indicated operation.

30)  $h(n) = -2n - 1$   
 $g(n) = n^2 - 4n$   
 Find  $(h+g)(n)$  Add.

31)  $g(a) = 4a - 1$   
 $h(a) = 3a - 3$   
 Find  $(g \circ h)(-3)$   
 $g(h(-3))$   
 $h(-3) = 3(-3) - 3 = -9 - 3 = -12$   
 $g(-12) = 4(-12) - 1 = -48 - 1 = -49$

$-2n - 1 + n^2 - 4n$   
 $n^2 - 6n - 1$

Find the inverse of each function.

32)  $f(x) = 4 - \frac{3}{5}x$   
 $y = 4 - \frac{3}{5}x$   
 $x = 4 - \frac{3}{5}y$   
 $x - 4 = -\frac{3}{5}y$

$\frac{5x - 20}{5} = \frac{3y}{5}$   
 $y = \frac{5x - 20}{3}$

Identify the domain and range of each.

33)  $y = 2\sqrt{x-4}$   
 TR  $x \neq \text{neg}$  or  $4$   
 $x \geq 4$

State the transformations on the parent function.

34)  $y = \sqrt{x+2} + 4$   
 left 2 & up 4

Chapter 7 Final Rw

35) What is the base of  $\log 7$ ?

$(10)$

36) A natural logarithm has a base of what? A common logarithm has a base of what?

natural = e

common = 10

37) In the expression  $\log_3 4 = x$  what is the base?

$(3)$

38) Write down the formulas:

Compound Interest:  $P_0(1+r)^t$

Continuous Compound Interest:  $Pe^{rt}$

Exponential Growth and Decay:  $A(1+r)^t$

Rewrite each equation in exponential form.

39)  $\log_8 64 = 2$        $8^2 = 64$  ✓

Rewrite each equation in logarithmic form.

40)  $18^2 = 324$        $\log_{18} 324 = 2$

Use a calculator to approximate each to the nearest thousandth.

41)  $\log_3 33$        $\frac{\log 33}{\log 3} \approx 3.183$

Condense each expression to a single logarithm.

42)  $25 \log_9 u - 5 \log_9 v$        $\log_9 u^{25} - \log_9 v^5 = \log_9 \frac{u^{25}}{v^5}$

Solve for x.

43)  $\log_x 25 = 2$        $x^2 = 25$   
 $x = 5$

44)  $\log_3 81 = x$        $3^x = 81$   
 $x = 4$

Solve each equation.

45)  $6^{2x} = 216$        $6^{2x} = 6^3$   
 $2x = 3$   
 $x = 3/2$

46)  $\log_5 x - \log_5 (x-6) = 2$

47) You deposit \$500 into a bank account earning 12% interest compounded daily. Using the equation

$P = P_0 \left(1 + \frac{r}{n}\right)^{nt}$ , what is the value of n?

$500(1+.12)^{nt}$   
 $n = 365$  daily

$\log_5 \frac{x}{x-6} = 2$

$25x - 150 = x$   
 $24 = 150$   
 $x = 6.25$

$5^2 = \frac{x}{x-6}$   
 $25 = \frac{x}{x-6}$

Solve each equation.

48)  $\log_{11} 4x = \log_{11} -2x$

no solution  
 $4x = -2x$

50)  $\log_9 2x + \log_9 2 = \log_9 33$

$109_9 4x = 109_9 33$   
 $\frac{4x}{4} = \frac{33}{4}$   
 $x = 8.25$

49)  $\log_6 3 - \log_6 2x = 1$

$109_6 \frac{3}{2x} = 1$

$\frac{3}{2x} = 1$

51)  $\log_7 7^7 = x$

$7^x = 7^7$   
 $x = 7$

$3 = 12x$   
 $x = 1/4$

Solve each equation. Round your answers to the nearest ten-thousandth.

52)  $9^{9p} + 3 = 73.1$

$9^{9p} = 70.1$

$9p \log 9 = \log 70.1$

$9p = 1.934$

$p = .2149$

53)  $20^{n-5} - 1 = 85$

$20^{n-5} = 86$

$n-5 \log 20 = \log 86$

$n = 6.4869$

54) You deposit \$1750 into a bank account earning 3% interest compounded continuously.

a) How much money will you have in your account after 4 years?

$1750 e^{(0.03 \times 4)}$

\$11973.12

b) After how many years will your bank account reach \$4000? Round to two decimal places.

$4000 = 1750 e^{(0.03x)}$

@ 27 years.  $\approx 28$

55) You purchase a car for \$28,000. It depreciates at a rate of 18% each year. How much is your car worth after 9 years?

$28,000 (1 - .18)^9$

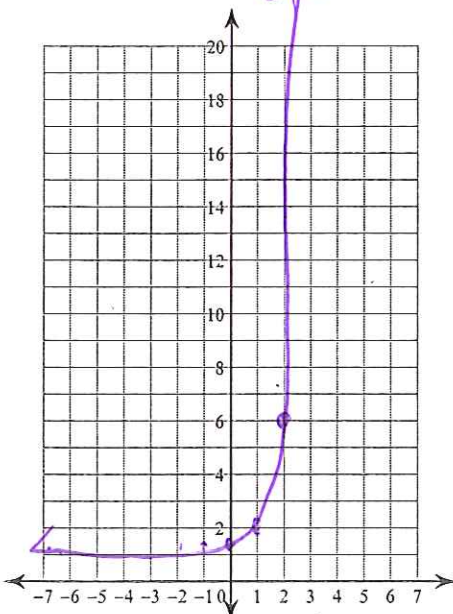
\$4693.35

Sketch the graph of each function.

56)  $y = \frac{1}{4} \cdot 5^x + 1$

compress 1/4

up 1

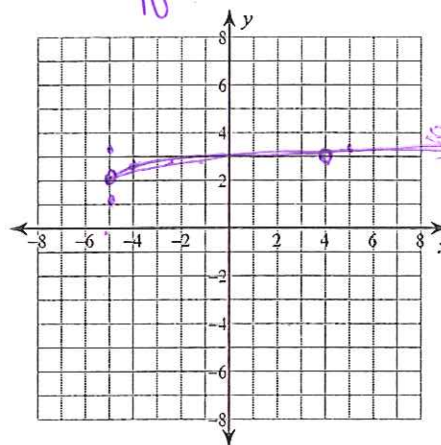


x	y
-2	1.008
-1	1.04
0	1.2
1	2
2	6
3	26

57)  $y = \log(x + 6) + 2$

left 6

up 2



x	y
-5	2
-4	2.3
-3	2.48
-2	2.7
-1	2.77
0	2.8
1	2.9
2	3
3	3.04

Ch 8 Rvw Questions

Write a function that models each variation.

58)  $x=5$  when  $y=15$ ,  $y$  varies inversely with  $x$ .

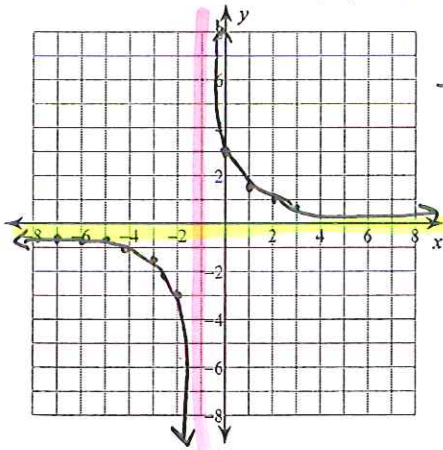
59)  $z=6$  when  $x=4$  and  $y=3$ ,  $z$  varies directly with  $y$  and inversely with  $x$ .

60)  $z=8$  when  $x=2$  and  $y=4$ ,  $z$  varies jointly with  $x$  and  $y$ .

Identify the holes and vertical asymptotes of each. Then sketch the graph.

61)  $f(x) = \frac{3}{x+1}$

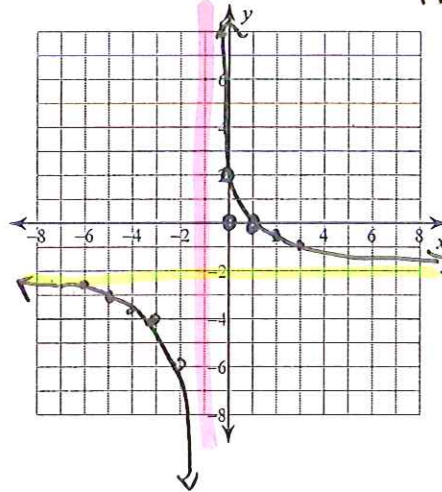
~~HA @ x = -1~~  
HA @ y = 0



x	y
-7	-0.5
-6	-0.6
-5	-0.75
-4	-1
-3	-1.5
-2	-3
-1	error
0	3
1	1.5
2	1
3	0.75

62)  $f(x) = \frac{4}{x+1} - 2$

~~HA @ x = -1~~  
HA @ y = -2

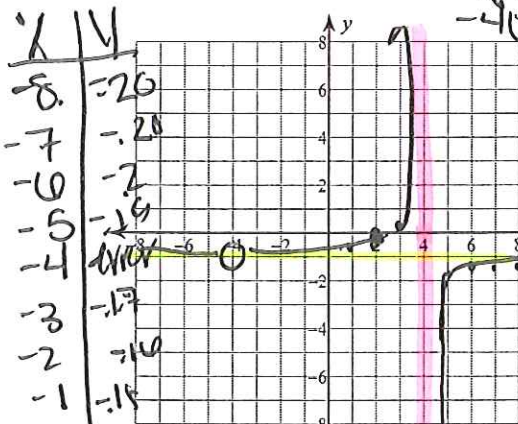


x	y
-6	-2.8
-5	-3
-4	-3.33
-3	-4
-2	-6
-1	error
0	2
1	0
2	-0.66
3	-1

Identify the points of discontinuity, holes, vertical asymptotes, horizontal asymptote, and domain of each. Then sketch the graph.

63)  $f(x) = \frac{x^2 + 2x - 8}{-4x^2 + 64}$

~~(x+4)(x-2)~~  
~~-4(x^2-16)~~  
~~-4(x+4)(x-4)~~



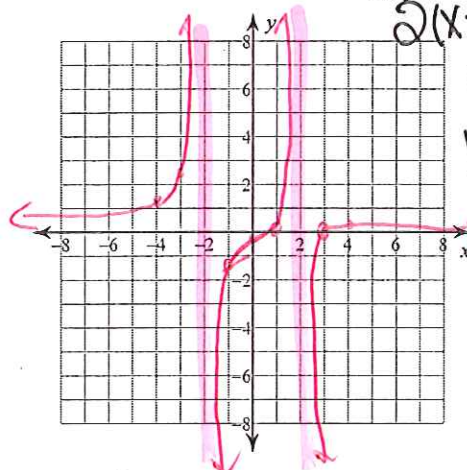
VA @ x = 4  
hole @ x = -4  
y = -1 HA.  
D: IR x ≠ 4

x	y
-8	-20
-7	-2.28
-6	-2
-5	-2.5
-4	error
-3	-1.7
-2	-1.6
-1	-1.5
0	-1.25
1	-0.8
2	0
3	0.25
4	error

x	y
5	-0.75
6	-0.5
7	-0.41
8	-0.375

64)  $f(x) = \frac{x^2 - 4x + 3}{2x^2 - 8}$

~~(x-1)(x-3)~~  
~~2(x^2-4)~~  
~~2(x+2)(x-2)~~



VA @ 2 & -2  
holes: none  
HA: y = 1/2

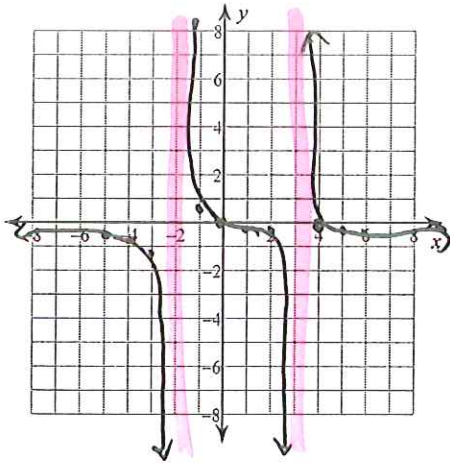
D: IR x ≠ -2 & 2

x	y
-4	1.4
-3	2.4
-2	error
-1	-1.33
0	-0.375
1	0
2	0.166
3	0
4	0.25

$$65) f(x) = \frac{x^2 - 4x}{-3x^2 + 3x + 18}$$

$$\frac{x(x-4)}{-3(x^2 + |x-6)} \quad \frac{x(x-4)}{-3(x-3)(x+2)}$$

X	Y
-5	-.025
-4	-.702
-3	-1.147
-2	error
-1	.414
0	0
1	-.166
2	-.333
3	error
4	0
5	-.119
6	-.166



holes - none  
 VA:  $x = 3, -2$   
 HA @  $y = -1/3$   
 D:R;  $x = -2$  &  $3$

Simplify each expression.

See next  
 pages  
 for work  
 & answers

$$66) \frac{3}{5r} + \frac{r-1}{5r+3}$$

$$67) \frac{6b}{b-3} + \frac{2b}{b+2}$$

$$68) \frac{6x}{2x-2} - \frac{6}{3x-2}$$

$$69) \frac{3}{2n} - \frac{4n-6}{5n+4}$$

$$70) \frac{6}{12a-24} \cdot \frac{32-16a}{2}$$

$$71) \frac{7}{v^2-16v+64} \cdot \frac{v^2-16v+64}{9}$$

$$72) \frac{7}{x-10} \div \frac{5x+5}{5x-50}$$

$$73) \frac{x-1}{7x-7} \div \frac{1}{x+6}$$

$$74) \frac{\frac{x+4}{3}}{\frac{x+4}{x}}$$

$$75) \frac{\frac{9}{u-3}}{\frac{u-3}{2}}$$

Solve each equation. Remember to check for extraneous solutions.

See next pages!

$$76) \frac{2}{p^2} = \frac{1}{p^2} + \frac{p+1}{2p^2}$$

$$77) \frac{1}{x^2-x} = \frac{x^2-4x+4}{x^2-x} - \frac{2x-1}{x}$$

$$78) \frac{n-1}{n^2+2n} = \frac{3}{n^3+2n^2} + \frac{n^2-3n+2}{n^3+2n^2}$$

79) Name all the seasons and the Months they officially start.

80) Know the final exam schedule and what time of the year it is.

$$66. \frac{(5r+3) \cdot 3}{(5r+3) \cdot 5r} + \frac{r-1}{5r+3} \cdot \frac{(5r)}{(5r)}$$

$$\frac{15r+9}{(5r+3)(5r)} + \frac{5r^2-5r}{(5r+3)(5r)}$$

\* Add w/ common den.

$$\frac{5r^2+10r+9}{(5r+3)(5r)}$$

$$67. \frac{(b+2) \cdot 0b}{(b+2)(b-3)} + \frac{2b}{b+2} \cdot \frac{(b-3)}{(b-3)}$$

$$\frac{0b^2+12b}{(b+2)(b-3)} + \frac{2b^2-6b}{(b+2)(b-3)}$$

$$\frac{8b^2+6b}{(b+2)(b-3)}$$

$$68. \frac{(3x-2) \cdot 0x}{(3x-2) \cdot 2x-2} - \frac{6}{3x-2} \cdot \frac{(2x-2)}{(2x-2)}$$

$$\frac{18x^2-12x}{(3x-2)(2x-2)} - \frac{12x-12}{(3x-2)(2x-2)}$$

\* Dist. the neg.

$$\frac{18x^2-12x-12x+12}{(3x-2)(2x-2)}$$

$$\frac{18x^2-24x+12}{(3x-2)(2x-2)}$$

Factor  
2(x-1)

$$\frac{9x^2-12x+6}{(3x-2)(x-1)}$$

$$69. \frac{(5n+4) \cdot 3}{(5n+4) \cdot 2n} - \frac{4n-6}{5n+4} \cdot \frac{2n}{2n}$$

$$\frac{15n+12}{(5n+4)(2n)} - \frac{8n^2-12n}{(5n+4)(2n)}$$

$$\frac{15n+12-8n^2+12n}{(5n+4)(2n)}$$

$$\frac{-8n^2+27n+12}{(5n+4)(2n)}$$



$$70. \frac{6}{12a-24} \cdot \frac{32-16a}{2}$$

$$\frac{6}{12(a-2)} \cdot \frac{+16(2-a)}{2}$$

$$\frac{6}{12(a-2)} \cdot \frac{-16(a-2)}{2} = \frac{6(-16)}{12(2)} = \frac{-96}{24} = \boxed{-4}$$

$$71. \frac{7}{v^2-16v+64} \cdot \frac{v^2-16v+64}{9}$$

$$\frac{7}{(v-8)(v-8)} \cdot \frac{(v-8)(v-8)}{9} = \boxed{\frac{7}{9}}$$

$$72. \frac{7}{x-10} \cdot \frac{5x-50}{5x+5} = \frac{7}{x-10} \cdot \frac{5(x-10)}{5(x+1)} = \boxed{\frac{7}{x+1}}$$

$$73. \frac{x+1}{7(x+1)} \cdot \frac{x+6}{1} = \boxed{\frac{x+6}{7}}$$

$$74. \frac{x+4}{3} \div \frac{x+4}{x} \Rightarrow \frac{x+4}{3} \cdot \frac{x}{x+4} = \boxed{\frac{x}{3}}$$

$$75. \frac{9}{u-3} \div \frac{u-3}{2} = \frac{9}{u-3} \cdot \frac{2}{u-3} = \boxed{\frac{18}{(u-3)^2} \text{ or } \frac{18}{u^2-6u+9}}$$

$$76. \frac{2}{p^2} = \frac{1}{p^2} + \frac{p+1}{2p^2}$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$2(2) = 2(1) + (p+1)$$

$$4 = 2 + p + 1$$

$$4 = p + 3$$

$$\begin{array}{r} -3 \\ -3 \end{array}$$

$$\boxed{p = 1}$$

$$77. \frac{1}{x^2 - x} = \frac{x^2 + 4x + 4}{x^2 - x} - \frac{2x - 1}{x}$$

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

$$1 = (x-2)(x-2) - (2x-1)(x-1)$$

$$1 = x^2 - 4x + 4 - 2x^2 + 1x + 2x + 1$$

$$1 = \underline{x^2} - \underline{4x} + \underline{4} - \underline{2x^2} + \underline{3x} + \underline{1}$$

~~$$1 = x^2 - 7x + 5$$

$$0 = x^2 - 7x + 4$$

$$-(x^2 + x + 4) = 0$$

$$-7 \pm \sqrt{49 - 4(1)(4)}$$

$$\frac{\quad}{2}$$~~

\* Don't forget to distri the neg!

I did whoops.

$$1 = -x^2 - x + 3$$

$$0 = -x^2 - x + 2$$

$$-1(x^2 + x - 2)$$

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

$$x = 1 \text{ or } x = -2$$

plug in & check

$$\boxed{x = -2}$$

$$78. \frac{n-1}{n^2+2n} = \frac{3}{n^3+2n^2} + \frac{n^2-3n+2}{n^3+2n^2} \quad \textcircled{1} \text{ factor.}$$

$$\frac{n-1}{n(n+2)} = \frac{3}{n^2(n+2)} + \frac{(n-2)(n-1)}{n^2(n+2)} \quad \textcircled{2} \begin{array}{l} n^2(n+2) \\ \text{is den.} \\ \text{mult by.} \end{array}$$

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

↓

$$n(n-1) = 3 + (n-2)(n-1)$$

$$\begin{array}{r} n^2 - n \\ -n^2 + 3n \end{array} = 3 + \begin{array}{r} n^2 - 3n + 2 \\ -n^2 + 3n \end{array}$$

$$0 + 2n = 5$$

$$2n = 5$$

$$\boxed{n = 5/2}$$

79. Summer → June  
 Fall → Sept.  
 Winter → Dec.  
 Spring → March

80. First - May  
 May is Spring! 😊