Hon Pre-Calc

Test Chapter 7 Name [redacted] 76/80

Show All Work for Full Credit!!! Circle All Final Answers!! Leave Any General Solutions In Terms Of Z!!!

Short Answer

1. Solve the given system. $\begin{cases} y = x^3 - 3x^2 + 4 \\ y = -2x + 4 \end{cases}$

- Different family
- Graphing calculator

$(0,4)$, $(2,0)$, $(1,2)$

2. Solve the given system. $\begin{cases} y = \sqrt{x+1} \\ y = (x+1)^3 \end{cases}$

Different Family

Graphing Calc

$(-1,0)$

$(0,1)$

-2

3. Solve the given system. $\begin{cases} xy - 1 = 0 \\ 2x - 4y + 7 = 0 \end{cases}$

$y = \frac{1}{x}$

$2x - \frac{4}{x} + 7 = 0$

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

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

$2x^2 + 8x - x - 4 = 0$

$2x(x+4) - 1(x+4) = 0$

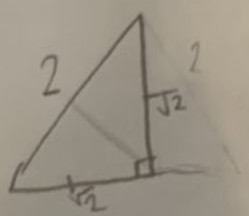
$x = \frac{1}{2}, \quad x = -4$

$x = \frac{1}{2}$ $\quad x = -4$

$y = \frac{1}{\frac{1}{2}}$ $\quad y = \frac{1}{-4}$

$\left(\frac{1}{2}, 2\right), \left(-4, -\frac{1}{4}\right)$

4. What are the dimensions of an isosceles right triangle with a 2 inch hypotenuse an area of 1 square inch?



$\frac{1}{2}bh = 1\text{in}^2$

$a^2 + a^2 = 2^2$

$\sqrt{a^4} = \sqrt{4}$

$a = \sqrt[4]{4}$

$\sqrt{2}$ in. by $\sqrt{2}$ in. by 2 in.

5. Solve the following system for u and v:
$\begin{cases} v\cos x = -u\sin x \\ u\cos x - \sec x = v\sin x \end{cases}$

$v = -u\tan x$

$u\cos x - \sec x = \frac{-u\sin^2 x}{\cos x}$

$\frac{u\cos^2 x}{\cos x} + \frac{u\sin^2 x}{\cos x} - \frac{1}{\cos x} = 0$

$\frac{u\cos^2 x + u\sin^2 x - 1}{\cos x} = 0 \cdot \cos x$

$u(\cos^2 x + \sin^2 x) - 1 = 0$

$u - 1 = 0$

$u = 1$

$u = 1$

$v = -\tan x$

$v = -u\frac{\sin x}{\cos x}$

$v = -\frac{\sin x}{\cos x}$

6. Find the value of k and m so that the system has infinite solutions.

$$\begin{cases} 15x+3y=m \\ -10x+ky=9 \end{cases}$$

slope = -5

$\frac{-10}{k} = -5$ $\quad k=2$

$\frac{m}{-2} = \frac{27}{3}$ $\quad m = \frac{27}{-2}$

$m = -\frac{27}{2}$

$k = -2$

$15x+3y=-\frac{27}{2}$ $\quad -10x+(-2y)=9$

7. Solve the system. $\begin{cases} 5x-3y+2z=3 \\ 2x+4y-z=7 \\ x-11y+4z=3 \end{cases}$

$10x-6y+4z=6$

$-x+11y+4z=3$

$9x+5y=3$

$5x-3y+2z=3$

$+\ 4x+8y-2z=14$

$9x+5y=17$

$17 \neq 3$

No Solution!

8. Solve the system. $\begin{cases} x+2z=5 \\ 3x-y-z=1 \\ 6x-y+5z=16 \end{cases}$

$3x-y-z=1$

$+\ -6x+y-5z=-16$

$-3x-6z=-15$

$x+2z=5$ $\quad x+2z=5$

$5=5$ Infinite

$x=5-2z$

$3(5-2z)-y-z=1$

$15-6z-y=1+z$

$-y=1+z+6z-15$

$-y=1+7z-15$

$-y=7z-14$

$y=-7z+14$

$(5-2z, -7z+14, z)$

9. You work at
station. Yo
2 hours. Y
latest coun
to play tw

9. You work as a disc jockey at your college radio station. You are supposed to play 32 songs within 2 hours. You are to choose the songs from the latest country, rock, and hip-hop albums. You want to play twice as many country songs as hip-hop songs and four more hip-hop songs than rock songs. How many of each type of songs will you play?

x = # of country y = # of rock z = # of hip hop

$x+y+z=32$

$x=2z$

$z=y-4$

$2z+z+y=32$

$3z+y=32$

$y=32-3z$

$z=32-3z-4$

$4z=28$

$z=7$

$y=32-21$

$y=11$

$x=22$

$x+y+z=32$

$x=2z$

$z=y+4$

$y=z-4$

$3z+y=32$

$3z+z-4=32$

$4z=36$

$z=9$

$y=5$

$x=18$

18 country songs
5 Rock songs
9 Hiphop songs

10. Write the partial fraction decomposition of:

$$\frac{3x^2+4x}{(x^2+1)^2}$$

$$\frac{3x^2+4x}{(x^2+1)(x^2+1)} = \frac{Ax+B}{(x^2+1)} + \frac{Cx+D}{(x^2+1)^2}$$

$(Ax+B)(x^2+1)+(Cx+D)=3x^2+4x$

$Ax^3+Bx^2+Ax+B+Cx+D=3x^2+4x$

$A=3$

$3+C=4$

$C=4$

$Bx^2=3x^2$

$B=3$

$A=0$

$Ax+Cx=4x$

$B+D=0$

$3+D=0$

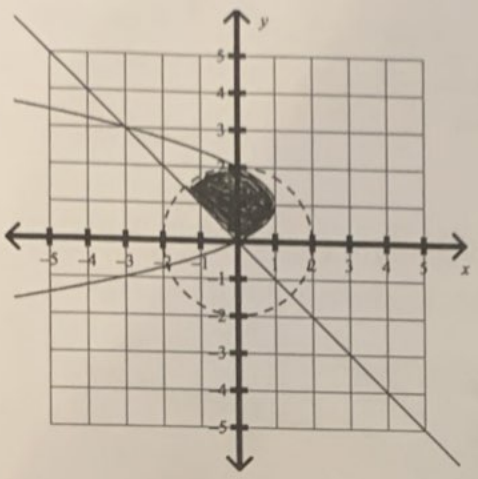
$D=-3$

$$\frac{3x^2+4x}{(x^2+1)^2} = \frac{3}{(x^2+1)} + \frac{4x-3}{(x^2+1)^2}$$

#12 answer:

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

11. Given the graph. Write a system of inequalities that describes the shaded region.



$$\begin{cases} y \geq 0 \\ x^2+y^2 < 4 \\ y \geq -x \\ x \leq -(y-1)^2+1 \end{cases}$$

Vertex: (1,1)

going left

~~$a=-1$~~

$x = a(y-k)^2 + k$

$x = -a(y-1)^2 + 1$

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

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

$\sqrt{-x+1} = y-1$

$y = \sqrt{-x+1} + 1$

$y = -\sqrt{-x+1} + 1$

12. Write the partial fraction decomposition of:

$$\frac{2x^4+8x^3+7x^2-7x-12}{x^3+4x^2+4x}$$

$$2x$$

$$x^3+4x^2+4x+0 \;\overline{)\; 2x^4+8x^3+7x^2-7x-12}$$

$$-2x^4-8x^3+8x^2+0 \downarrow$$

$$-x^2-7x-12$$

$$2x + \frac{-x^2-7x-12}{x^3+4x^2+4x} = \frac{-3}{x} + \frac{B}{x+2} + \frac{Cx+D}{(x+2)^2}$$

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

$$x(x+2)^2$$

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

$$A(x^2+4x+4) + B(x^2+2x) + (x^2+Dx = -x^2-7x-12$$

$$Ax^2+4Ax+4A+Bx^2+2Bx+Dx$$

$$-3x^2+Bx^2+x^2+4Bx+2Bx+Dx-7x-12$$

~~$4A=-12$~~

~~$A=-3$~~

$$A(x+2)^2 + B(x)(x+2) + (x+D)(x) = -x^2-7x-12$$

let $x=0$

$4A=-12$

$A=-3$

$(-2C+D)(-2) = -4$

$4C+-2D=-4$

Seperate Steeet!

$$-\frac{x^2-7x-12}{x(x+2)^2} = \frac{-3}{x} + \frac{1}{(x+2)} + \frac{x+3}{(x+2)^2}$$

13. Shifan is wor
extra for date
24 hours per
an average
and require

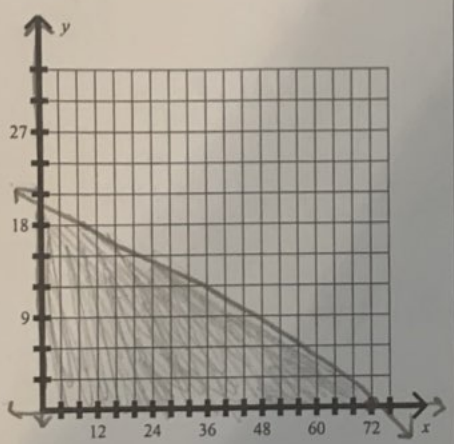
13. Shifan is working part time as a hairdresser to earn extra for date night. Shifan may work no more than 24 hours per week. Haircuts cost $25 and require an average of 20 minutes, and permanents cost $70 and require an average of 1 hour and 10 minutes.

1440 x = # of haircuts y = # of perms

a) Write system of inequalities that models the constraints.

$$\begin{cases} x \geq 0 \quad 20x + 70y \leq 1440 \\ y \geq 0 \end{cases}$$

b) Graph the system of inequalities.



c) Write the objective function.

$R = 25x + 70y$

d) List all the vertices of the feasible region.

$(0,0)$, $(72,0)$, $(0, 20.57)$

e) What combination of haircuts and/or permanents will yield an optimal revenue?

72 haircuts Zero Permanents

f) What is the optimal revenue?

$R = 25(72) + 70(0)$

$R = \$1800$

George Dantzig was born in 1914.

Founder of Linear Programming

$$x^3+4x^2+4x+0 \;\overline{)\; 2x^4+8x^3+7x^2-7x-12}$$

$$2x$$

$$-2x^4-8x^3-8x^2-0$$

$$-x^2-7x-12$$

$$2x+\frac{-x^2-7x-12}{x(x+2)^2}=\frac{-3}{x}+\frac{B}{(x+2)}+\frac{(x+D}{(x+2)^2}$$

$$Ax^2+Bx^2+Cx^2+4Ax+2Bx+Dx+4A=-x^2-7x-12$$

$$A(x+2)^2+B(x)(x+2)+((x+D)(x)=-x^2-7x-12$$

$A(x+2)(x+2)$

let $x=0$

$$4A=-12$$

$$A=-3$$

$$Ax^2+Bx^2+Cx^2=-x^2$$

$$A+B+C=-1$$

$$B+C=2$$

$$B=1 \quad C=1$$

$$4Ax+2Bx+Dx=-7x$$

$$-12x+2Bx+Dx=-7$$

$$2B+D=5$$

$$D=3$$

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