

Plant

Precalculus FAMAT Regional March 20, 1993

B 1. $\frac{4-k}{-5} = -\frac{1}{3}$ $12-3k=5$ $-3k=-7$ $k=\frac{7}{3}$

D 2.



A 3. $a[a(bc+bc+1)]' = a[a(1)]' = aa' = 0$

C 4. two

A 5. $\frac{|2(0)+1(0)-5|}{\sqrt{5}} = \frac{5}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \sqrt{5}$ $|r| \geq \sqrt{5}$

B 6. $9(x^2 - 8x + 16) + 4(y^2 - 6y + 9) = -144 + 144 + 36$ $9(x-4)^2 + 4(y-3)^2 = 36$
 $\frac{(x-4)^2}{4} + \frac{(y-3)^2}{9} = 1$ $C(4,3)$ $C = \sqrt{9-4} = \sqrt{5}$ $(4, 3 \pm \sqrt{5})$

C 7. $\frac{1}{2} \frac{1}{2} \frac{-5}{3} \frac{2}{-2}$ $\cos \theta = 1$ $\cos \theta = \frac{1}{2}$ $\cos \theta = -2$ $\frac{\pi}{3} + \frac{5\pi}{3} = 2$
 $\frac{2}{2} \frac{3}{3} \frac{-2}{-2} 0$ 0 $\frac{\pi}{3}$ $\frac{5\pi}{3}$ \emptyset
 $(2x-1)(x+2)$

B 8. $r = -\frac{x^3}{x^2} = -x$ $\frac{x^2}{1+x} = \frac{x}{6}$ $6x^2 = x + x^2$ $5x^2 - x = 0$ $x(5x-1) = 0$ $x = \frac{1}{5}$

E 9. $[\frac{1}{2} \cdot \frac{25}{51}] \times 2 = \frac{25}{51}$

DA 10. $84 = \frac{1}{2}(14)(15) \sin p$ $168 = (14)(15) \sin p$ $12 = 15 \sin p$

$\sin p = \frac{4}{5}$ $\cos p = \frac{3}{5}$ or $\cos p = -\frac{3}{5}$

$p^2 = (14)^2 + (15)^2 - 2(14)(15)(\frac{3}{5})$ $p^2 = 196 + 225 - 252$ $p^2 = 169$ $p = 13$

$p^2 = (14)^2 + (15)^2 - 2(14)(15)(-\frac{3}{5})$ $p^2 = 196 + 225 + 252$ $p^2 = 673$ $p = \sqrt{673}$

C 11. $3(-1) - 2(4) + 2(1) = -9$ $3x - 2y + z = -9$

D 12.

A 13. $x_1 = -3 + \frac{1}{3}(9) = 0$ $y_1 = -4 + \frac{1}{3}(15) = 1$ $(0, 1)$

$x_2 = -3 + \frac{2}{3}(9) = 3$ $y_2 = -4 + \frac{2}{3}(15) = 6$ $(3, 6)$

B 14. $x=1$ vertical plant $y = \frac{x^2+x-3}{x-1} = x+2 + \frac{-1}{x-1}$ $y = x+2$

A 15. $\frac{24}{x+2} + \frac{24}{x-2} = \frac{50}{x}$ $24x^2 - 48x + 24x^2 + 48x = 50x^2 - 200$

$48x^2 = 50x^2 - 200$ $2x^2 - 200 = 0$ $2(x^2 - 100) = 0$ $x = 10$

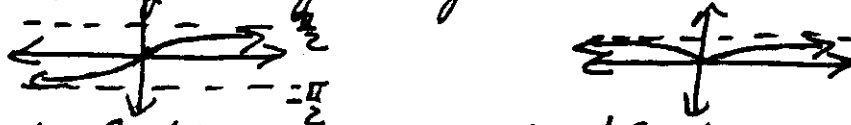
C 16. $h(3) = \sqrt{6}$ $g(\sqrt{6}) = [\sqrt{6} + 1] = 3$ $f(3) = 9 - 1 = 8$

B 17. $e^{\ln \frac{3x^2}{5}} = \frac{3x^2}{5}$

A 18. $\frac{50.4 \times 100,000 \times 2\pi}{7\pi \cdot 3600} = 40$ $\frac{50.4 \times 10,000 \times 2\pi}{7\pi \cdot 3600} = 40$

E 19. $[\frac{L}{2+L}]^{-2} = [\frac{3+4}{L}]^2 = [\frac{7}{L} + 1]^2 = \frac{49}{L^2} + \frac{14}{L} + 1 = -4 + \frac{49}{L^2} + 1 = -3 - \frac{49}{L^2}$

C 20. $\frac{\frac{1}{x} + \frac{3}{y}}{\frac{1}{x^2} + \frac{4}{y} + \frac{3}{y^2}} = \frac{xy^2 + 3x^2y}{y^2 + 4xy + 3x^2}$

B 21.  $y = \arctan x$ $y = |\arctan x|$ $0 \leq \phi < \frac{\pi}{2}$

D 22.
$$\begin{array}{r} -11 \quad 1 \quad 3 \quad 7 \quad 13 \quad 12 \quad 4 \\ \quad \quad -1 \quad -2 \quad -5 \quad -8 \quad -4 \\ \hline 1 \quad 2 \quad 5 \quad 8 \quad 4 \quad 0 \end{array} \quad \begin{array}{r} -11 \quad 1 \quad 2 \quad 5 \quad 8 \quad 4 \\ \quad \quad -1 \quad -1 \quad -4 \quad -4 \\ \hline 1 \quad 1 \quad 4 \quad 4 \quad 0 \end{array} \quad \begin{array}{r} -11 \quad 1 \quad 1 \quad 4 \quad 4 \\ \quad \quad -1 \quad 0 \quad -4 \\ \hline 1 \quad 0 \quad 4 \quad 0 \end{array}$$

$(x+1)^3(x^2+4) = (x+1)^3(x+2i)(x-2i)$

A 23.
$$\begin{vmatrix} i & j & k \\ 1 & -2 & 1 \\ 2 & 3 & -1 \end{vmatrix} \begin{vmatrix} i & j \\ 1 & -2 \\ 2 & 3 \end{vmatrix} \quad 2i + 2j + 3k - (-4k + 3i - j) = -i + 3j + 7k$$

B 24. $A^2 = \begin{bmatrix} 1 & 3 \\ -2 & 4 \end{bmatrix} \begin{bmatrix} 1 & 3 \\ -2 & 4 \end{bmatrix} = \begin{bmatrix} -5 & 15 \\ -10 & 10 \end{bmatrix} \quad \begin{bmatrix} 2 & 4 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} -5 & 15 \\ -10 & 10 \end{bmatrix} = \begin{bmatrix} -50 & 90 \\ -5 & 15 \end{bmatrix}$

D 25.
$$\begin{cases} 3 \log x + \log y = 3.7 \\ \log x - \log y = 2.1 \end{cases} \quad \begin{cases} 4 \log x = 5.8 \\ \log x = 1.45 \end{cases} \quad \begin{cases} 1.45 - \log y = 2.1 \\ -\log y = .65 \\ \log y = -.65 \end{cases}$$

$\log y = -.65 \quad x = 10^{1.45} \quad y = 10^{-.65} \quad xy = 10^{1.45 - .65} = 10^{.8}$

D 26.

A 27. $\binom{15}{4} = \frac{15!}{4!11!} = \frac{15 \cdot 14 \cdot 13 \cdot 12}{4 \cdot 3 \cdot 2 \cdot 1} = 1365$

C 28. I, II, IV

B 29.

E 30. $\frac{\binom{?}{4} (\sqrt{2}x)^3 (\frac{1}{2})^4}{35\sqrt{2}x^3 \cdot 8} = \frac{7!}{4!3!} (2\sqrt{2}x^3) (\frac{1}{16}) = \frac{35 \cdot 2\sqrt{2}x^3}{16}$