Mu- Analytic Geometry Solutions

1. B $\quad b^2-4AC \quad Ax^2+Bxy+Cy^2+\ldots=0$

$b^2-4AC= \quad 12-4(3)(1)= \quad 0 \quad$ parabola

2. $\boxed{C}$ $A=\pi ab=\pi\left(\frac{11}{2}\right)\left(\frac{4}{2}\right)=\pi\cdot 11=11\pi$

3. $\boxed{D}$ $A=\frac{1}{2}\left|\begin{matrix}-2 & 7 & 1\\ 6 & 8 & 1\\ 1 & -1 & 1\end{matrix}\right|=\frac{1}{2}|-67|=\frac{1}{2}(67)=\frac{67}{2}=33.5$

4. A $\quad P=2n\cancel{r}\tan\pi/n$

$P=2(6)\cancel{r}\tan\frac{\pi}{6}$

$12(10)\frac{1}{\sqrt{3}}=\frac{120}{\sqrt{3}}=\frac{120\sqrt{3}}{3}=40\sqrt{3}$

5. E $\quad \frac{|Ax_1+By_1+c|}{\sqrt{A^2+B^2}}$ $\quad Ax+By+c=0$
$2x-y+1=0$ $\quad \frac{|2(4)-1(1)+1|}{\sqrt{4+1}}=\frac{8}{\sqrt{5}}$

6. B $\quad \frac{\cancel{(x+1)}(4x^2-3)}{\cancel{(x+1)}(x+2)}$ $\quad$ VA at $x=-2$

7. B

8. B

When $x=1$; $\quad y^2+2y+1+3+4y+2=0$

$y^2+6y+6=0$

$y=\frac{-6\pm\sqrt{36-24}}{2}=\frac{-6\pm2\sqrt{3}}{2}=-3\pm\sqrt{3}$

When $x=-1$; $\quad y^2-2y+1-3+4y+2=0$

$y^2+2y=0$

$y(y+2)=0 \quad y=0$ or $y=-2$

points are $(1,-3-\sqrt{3})$ $\quad (1,-3+\sqrt{3})$, $(-1,0)$ $\quad (-1,-2)$

The two which are farthest apart are: $(1,-3-\sqrt{3})$ and $(-1,0)$

distance $AC=\sqrt{4+9+6\sqrt{3}+3}=\sqrt{16+6\sqrt{3}}$

$p-q=16-6=10$

9. (B) $(a+d)^2 = a^2 + (a-d)^2$

$\cancel{a^2} + 2ad + \cancel{d^2} = \cancel{a^2} + a^2 - 2ad + \cancel{d^2}$

$0 = a^2 - 4ad$

$\frac{4ad}{a} = \frac{a^2}{a}$

$\frac{4\cancel{d}}{\cancel{d}} = \frac{a}{d}$ $\quad \frac{a}{d} = 4 \quad \left(\frac{a}{d}\right)^2 = 16$

10. (A) radius $= \sqrt{\frac{(s-a)(s-b)(s-c)}{s}}$

$s = \frac{1}{2}(70) = 35$ $\quad$ radius $= \sqrt{\frac{(35-20)(35-21)(35-29)}{35}}$

$\sqrt{\frac{15(14)(6)}{35}} = \sqrt{36} = 6$

$r = 6$, diameter $= 12$

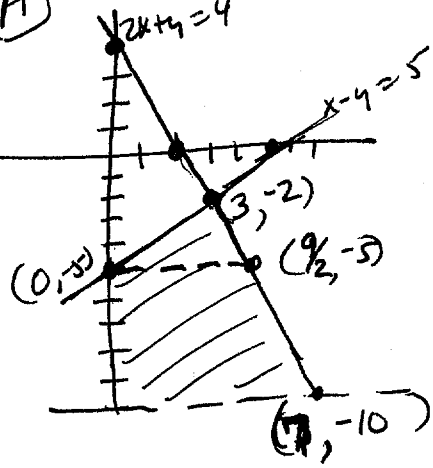
11. (E) original Area $= lw$

new area $= (1.15l).80w = .92lw$

8% decrease in area

NOTA

12. (A)



area of $\Delta = \frac{1}{2}\left|\begin{vmatrix} 0 & -5 & 1 \\ 3 & -2 & 1 \\ 9/2 & -5 & 1 \end{vmatrix}\right| = \frac{1}{2}|-13.5| = 6.75$

area of trapezoid $= \frac{1}{2}(5)\left(\frac{9}{2}+7\right)$

$\frac{5}{2}\left(\frac{23}{2}\right) = \frac{115}{4}$

$\frac{115}{4} + 6.75$

$28.75 + 6.75 = 35.5$

13. B $\frac{4}{3}\pi r^3 = 4\pi r^2$

$r^3 = \cancel{4} r^2 \cdot \frac{3}{\cancel{4}}$

$r^3 = 3r^2$

$r^3 - 3r^2 = 0$

$r^2(r-3) = 0$

$\cancel{r=0}, r=3$

$\frac{2\cancel{\pi} r}{\cancel{\pi} r^2} = \frac{2}{r} = \frac{2}{3}$

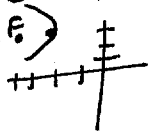
14. $\boxed{D}$ $(x-2)^2 = 12(y+3)$

$4p = 12$ = length of latus rectum

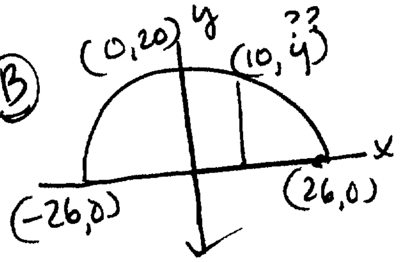
15. E $(y-3)^2 = -8(x+2)$ focus

$4p = -8$ $(-4, 3)$

$p = 2$



16. B



$\frac{x^2}{(26)^2} + \frac{y^2}{(20)^2} = 1$

$\frac{x^2}{676} + \frac{y^2}{400} = 1$

$\frac{x^2}{676} + \frac{100}{400} = 1$

$\frac{x^2}{676} = \frac{3}{4}$

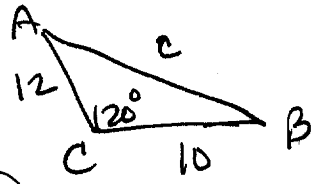
$4x^2 = 3(676)$

$x^2 = 3(169)$

$x = 13\sqrt{3}$

$2x = 26\sqrt{3}$

17. A $\frac{1}{6}\begin{vmatrix} 3 & 1 & 0 & 1 \\ 1 & 4 & 0 & 1 \\ 5 & 5 & 0 & 1 \\ 3 & 1 & 6 & 1 \end{vmatrix} = \frac{1}{6}(84) = \frac{84}{6} = \frac{42}{3} = 14$

18. 

$c^2 = 12^2 + 10^2 - 2(12)(10)\cos 120^\circ$

$\sqrt{364} = 19.079$

$\sqrt{4 \cdot 91} = 2\sqrt{91}$

A is answer

19. A

20. B $m_1 = 3/4, \quad m_2 = -2/3$

$\tan\theta = \left|\dfrac{m_1 - m_2}{1 + m_1 m_2}\right| = \dfrac{3/4 + 2/3}{1 + 3/4(-2/3)} = \dfrac{\frac{17}{12}}{1 - 1/2} = \dfrac{\frac{17}{12}}{\frac{1}{2}} = \dfrac{17}{12} \cdot \dfrac{2}{1} = \dfrac{17}{6}$

21. B $x = 8\cos\theta \qquad y = 6\sin\theta \qquad \cos^2\theta + \sin^2\theta = 1 \qquad \dfrac{x^2}{64} + \dfrac{y^2}{36} = 1$

$\dfrac{x}{8} = \cos\theta \qquad \dfrac{y}{6} = \sin\theta \qquad \left(\dfrac{x}{8}\right)^2 + \left(\dfrac{y}{6}\right)^2 = 1$

ellipse area $= \pi ab = \pi(8)(6) = 48\pi$

22. C $2x + 2yy' + 2 - 4y' = 0$

$y'(2y - 4) = -2x - 2$

$y' = \dfrac{-2x-2}{2y-4} = \dfrac{2x+2}{4-2y} = \dfrac{\cancel{2}(x+1)}{\cancel{2}(2-y)} = \dfrac{x+1}{2-y}$

at $(2,1)$

$y' = \dfrac{3}{1} = 3$

$y - 1 = 3(x-2)$

$y = 3x - 6 + 1$

$y = 3x - 5$

23.) C

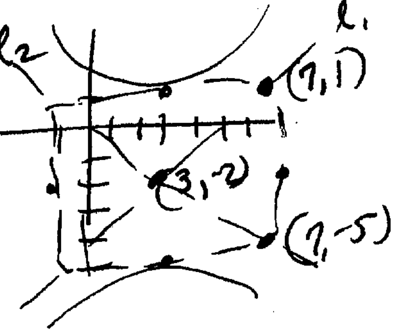
$c^2 = a^2 - b^2 \qquad e = \dfrac{c}{a} = .75 \qquad .75 = \dfrac{c}{4} \qquad c = 3$

$c^2 = 16 - b^2$

$9 = 16 - b^2$

$b^2 = 7 \qquad b = \sqrt{7}$

24. (C)



Eq of asymptotes l_1

$m = \frac{3}{4}$

$y - 1 = 3/4\,(x-7)$ ↗ $y = \frac{3}{4}x - \frac{21}{4} + 1$

$y = 3/4\,x - \frac{17}{4}$

25. $\boxed{A}$

$\frac{1}{2}\left(\cot^{-1}\frac{(A-C)}{B}\right)$

$\frac{1}{2}\left(\cot^{-1}\frac{(1-2)}{1}\right) = \frac{1}{2}\cot^{-1}(-1) = \frac{1}{2}\left(\frac{3}{4}\pi\right) = \frac{3}{8}\pi$

26. (C)

$2\left[\frac{1}{2}\int_0^{\pi}(1+\cos\theta)^2\,d\theta\right]$

$= \int_0^{\pi}(1 + 2\cos\theta + \cos^2\theta)\,d\theta = \int_0^{\pi}\left(1 + 2\cos\theta + \frac{\cos 2\theta + 1}{2}\right)d\theta$

$= \theta + 2\sin\theta + \frac{1}{4}\sin 2\theta + \frac{1}{2}\theta$

$\left[\frac{3}{2}\theta + 2\sin\theta + \frac{1}{4}\sin 2\theta\right]_0^{\pi}$

$= \left[\left(\frac{3}{2}\pi + 0 + 0\right) - (0+0+0)\right] = \frac{3}{2}\pi$

27. (A)

$r = \frac{de}{1 + e\cos\theta}$

$r = \frac{2(3/2)}{1 + 3/2\cos\theta} =$

$\frac{3}{1 + 3/2\cos\theta} = \frac{6}{2 + 3\cos\theta}$

28.) (C) $\int_1^3 \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2}\,dt = \int_1^3 \sqrt{16t + 4 - 8t + 4t^2}\,dt$

$\left(\frac{dx}{dt}\right)^2 = \left(4t^{1/2}\right)^2 = 16t$

$\left(\frac{dy}{dt}\right)^2 = (2-2t)^2$

$\int \sqrt{4t^2 + 8t + 4}\,dt$

$2\int \sqrt{(t^2 + 2t + 1)}\,dt$

$2\int \sqrt{(t+1)^2}\,dt =$

$2\int (t+1)\,dt$

$= 2\left[\frac{t^2}{2} + t\right]_1^3 = 2\left(\frac{9}{2} + 3 - \frac{1}{2} - 1\right) = 12$

29) $|A||B| \sin\theta$

C $\sqrt{1+4+4} \cdot \sqrt{9+4+1} \cdot \sin\theta$

$\sqrt{9} \cdot \sqrt{14}$

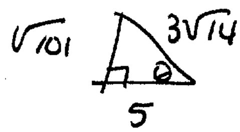
$\cos^{-1}\theta = \dfrac{A \cdot B}{\|A\|\|B\|}$

$3\sqrt{14} \sin\theta$

$\cancel{3\sqrt{14}} \cdot \dfrac{\sqrt{101}}{\cancel{3\sqrt{14}}}$

$\cos^{-1}\theta = \dfrac{-3 + -4 + 2 = -5}{3\sqrt{14}}$

$A = \sqrt{101}$



Quad II

30. $\boxed{D}$ $V = 2\pi \int_0^b x \sin x^2 \, dx$

$\frac{1}{2} \cancel{2}\pi \int x (\sin x^2) 2 \, dx$

$\pi \int \sin u \, du = -\pi \cos u = -\pi \left[\cos x^2\right]_0^b$

$-\pi(\cos b^2 - 1) = \pi/2$

$-\cos b^2 + 1 = \frac{1}{2}$

$\frac{1}{2} = \cos b^2$

$\pi/3 = b^2$

$\sqrt{\pi/3} = b$

P6