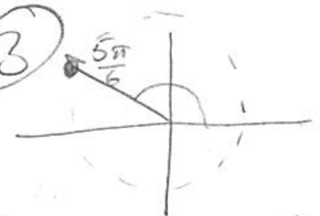
Semester II Review

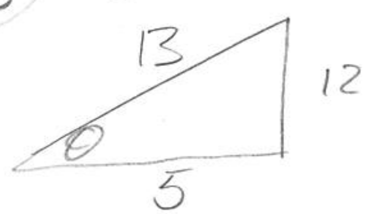
① $250^\circ \cdot \frac{\pi}{180^\circ} = \frac{25\pi}{18}$ radians

② $\frac{7\cancel{\pi}}{\cancel{3}} \cdot \frac{\overset{60}{\cancel{180}}}{\cancel{\pi}} = 420^\circ$

③  $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

④ $\cos(\overset{0}{\cancel{4\pi}} + \pi) = \cos\pi = -1$

⑤ $\cot\theta = \frac{5}{12} = \frac{Adj}{opp}$ $\quad \sin\theta = \frac{12}{13}$



⑥ $y = 3.25\cos 3x$

Amplitude: 3.25

period $= \frac{2\pi}{3}$

⑦ $\cos(\arcsin(\frac{1}{2}))$

$\cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$

⑧ $d = 3$

$a = 3$

starts @ zero, so for cos start @ max, shift $\frac{\pi}{2}$ right

$c = \frac{\pi}{2}$

$p = 2\pi = \frac{2\pi}{b} \Rightarrow b = 1$

$$\boxed{f(x) = 3\cos\left(x - \frac{\pi}{2}\right) + 3}$$

(9) Amplitude: 3

period $= 4\pi$

(10) $f(x) = 3\sin\left(\frac{1}{2}x\right)$

$4\pi = \frac{2\pi}{b}$

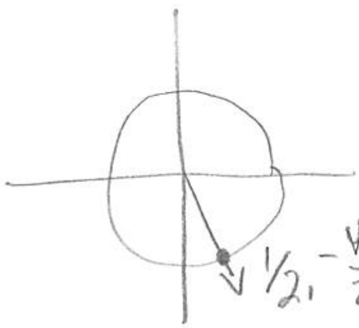
$b = \frac{1}{2}$

(11) $\frac{13\pi}{3} = 4\frac{1}{3}\pi$ 1st Quadrant.

(12) $445 \cdot \frac{\pi}{180} = \frac{89\pi}{36}$

(13) $t = \frac{5\pi}{3}$ $\sin t = -\frac{\sqrt{3}}{2}$ $\tan t = \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = -\sqrt{3}$

$\cos t = \frac{1}{2}$



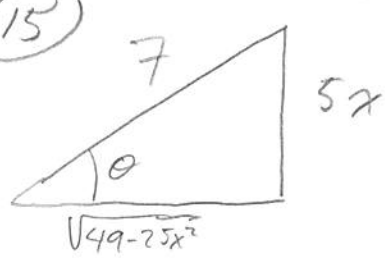
(14) $\cos x = \frac{7}{9} = \frac{adj}{hyp}$ $\sin x < 0$

$7^2 + x^2 = 9^2$

$x = \sqrt{32} = 4\sqrt{2}$

$\boxed{\cot x = \frac{7}{-4\sqrt{2}} \text{ or } \frac{7\sqrt{2}}{-8}}$

(15)



$(5x)^2 + b^2 = 49$

$b = \sqrt{49-25x^2}$

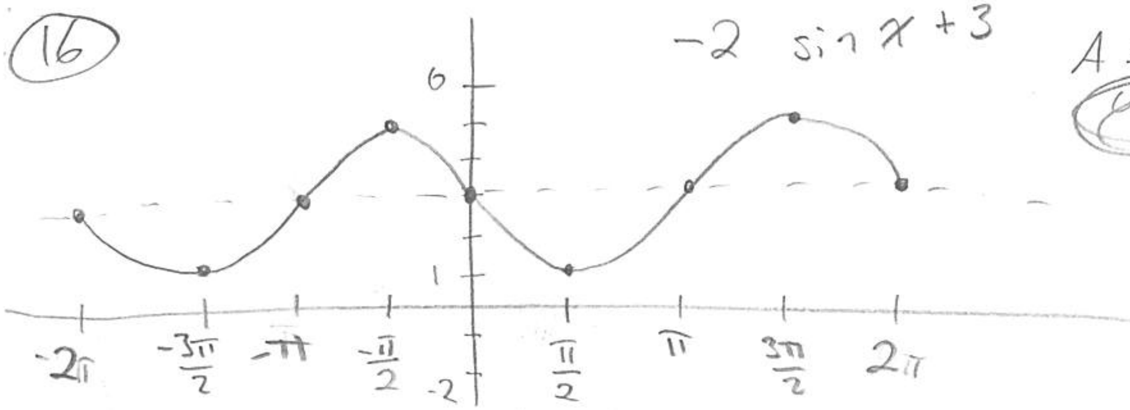
$\boxed{\cot\theta = \frac{\sqrt{49-25x^2}}{5x}}$

(16) $-2 \sin x + 3$

$A = 2$

up 3

Start @ 0, go down



(17) $y = 2\sin(3x - \pi) - 5$

Period: $\frac{2\pi}{3}$

Amplitude: 2

Vert shift: down 5

Horizontal shift: $-\left(-\frac{\pi}{3}\right) = \frac{\pi}{3}$ up

Range: $[-7, -3]$

Domain: $(-\infty, \infty)$

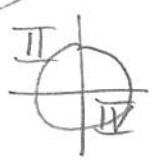
(18) $\csc 17.2° = 3.38$

(19) $2\sin\frac{x\pi}{3}$

Amp = 2

period: $\frac{2\pi}{\pi/3} = 6$

(20) $\cot\theta = -0.5$



$\cot^{-1}(-0.5) = \boxed{116.565°}$

$+ 180$

$\boxed{296.565°}$

(21) $\sin\frac{2\pi}{3} = 0.866025 = \frac{\sqrt{3}}{2}$

① $\sin\alpha \tan\alpha \sec\alpha \csc\alpha$

$\sin\alpha \cdot \frac{\cancel{\sin\alpha}}{\cos\alpha} \cdot \frac{1}{\cos\alpha} \cdot \frac{1}{\cancel{\sin\alpha}}$

$\frac{\sin\alpha}{\cos\alpha} \cdot \frac{1}{\cos\alpha}$

$\boxed{\tan\alpha \sec\alpha}$

$\sin^2\theta + \cos^2\theta = 1$

$1 + \cot^2\theta = \csc^2\theta$

② $\frac{(\cot\theta)^2}{1-(\sin\theta)^2} = \frac{\cot^2\theta}{\cos^2\theta} = \frac{\cancel{\cos^2\theta}}{\sin^2\theta} \cdot \frac{1}{\cancel{\cos^2\theta}} = \frac{1}{\sin^2\theta} \boxed{= \csc^2\theta}$

③ $\frac{\sin 2\beta}{\cos 2\beta - \cos^2\beta} = \frac{2\cancel{\sin\beta}\cos\beta}{\cancel{\cos^2\beta} - \sin^2\beta - \cancel{\cos^2\beta}} = -\frac{2\cos\beta}{\sin\beta} = \boxed{-2\cot\beta}$

④ $\frac{1+\csc\gamma}{1+\csc\gamma} \cdot \frac{2}{1-\csc\gamma} - \frac{2}{1+\csc\gamma} \cdot \frac{1-\csc\gamma}{1-\csc\gamma} = \frac{\cancel{2}+2\csc\gamma \cancel{-2}+2\csc\gamma}{1-\csc^2\gamma} = \frac{4\csc\gamma}{-\cot^2\gamma} = \frac{4\csc\gamma}{-\frac{\cos^2\gamma}{\sin^2\gamma}}$

$= 4 \cdot \frac{1}{\cancel{\sin\gamma}} \cdot \frac{-\sin^{\cancel{2}}\gamma}{\cos^2\gamma} = \boxed{-4\tan\gamma \sec\gamma}$

⑤ $1 - 4\sin^2\theta\cos^2\theta = (1-2\sin\theta\cos\theta)(1+2\sin\theta\cos\theta)$

$= (1-\sin 2\theta)(1+\sin 2\theta) = 1 - \sin^2 2\theta = \boxed{\cos^2 2\theta}$

⑥ $2\sin\alpha\cos^3\alpha + 2\sin^3\alpha\cos\alpha = 2\sin\alpha\cos\alpha(\cancel{\sin^2\alpha + \cos^2\alpha})^{1}$

$\boxed{= \sin 2\alpha}$

⑦ $\tan^2 x - \sin^2 x = \sin^2 x \tan^2 x$

$\frac{\sin^2 x}{\cos^2 x} - \frac{\sin^2 x}{1} \cdot \frac{\cos^2 x}{\cos^2 x} = \sin^2 x \tan^2 x$

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

$\frac{\sin^2 x(1-\cos^2 x)}{\cos^2 x} = \sin^2 x \tan^2 x$

$\boxed{\frac{\sin^2 x \cdot \sin^2 x}{\cos^2 x} = \sin^2 x \tan^2 x}$

(8) $\dfrac{\cos\theta}{1-\tan\theta} + \dfrac{\sin\theta}{1-\cot\theta} = \cos\theta + \sin\theta$

$$\frac{\cos\theta}{1-\frac{\sin\theta}{\cos\theta}} + \frac{\sin\theta}{1-\frac{\cos\theta}{\sin\theta}} = \frac{\cos\theta}{\frac{\cos\theta-\sin\theta}{\cos\theta}} + \frac{\sin\theta}{\frac{\sin\theta-\cos\theta}{\sin\theta}}$$

$$= \frac{\cos\theta \cdot \cos\theta}{\cos\theta-\sin\theta} + \frac{\sin\theta \cdot \sin\theta}{\sin\theta-\cos\theta} = \frac{\cos^2\theta}{\cos\theta-\sin\theta} - \frac{\sin^2\theta}{\cos\theta-\sin\theta}$$

$$= \frac{\cos^2\theta-\sin^2\theta}{\cos\theta-\sin\theta} = \frac{(\cos\theta+\sin\theta)\cancel{(\cos\theta-\sin\theta)}}{\cancel{\cos\theta-\sin\theta}} \boxed{=\cos\theta+\sin\theta}$$

(9) $\sec x - \sin x \tan x = \cos x$

$$\frac{1}{\cos x} - \sin x \cdot \frac{\sin x}{\cos x} = \frac{1-\sin^2 x}{\cos x} = \frac{\cos^{\cancel{2}} x}{\cancel{\cos x}} \boxed{=\cos x}$$

(10) $\cos^2 2\theta - \cos^2\theta = \sin^2\theta - \sin^2 2\theta$

$$\cancel{1}-\sin^2 2\theta - \cancel{1} + \sin^2\theta = \sin^2\theta - \sin^2 2\theta$$

(11) $\cos 2x = \cos x$

$$2\cos^2 x - 1 - \cos x = 0$$

$$2\cos^2 x - \cos x - 1 = 0$$

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

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

$$\boxed{x = \frac{2\pi}{3}, \frac{4\pi}{3} \qquad x = 0}$$

(12) $\sqrt{2}\sec x \sin x = \sec x$

$$\sqrt{2}\sec x \sin x - \sec x = 0$$

$$\sec x(\sqrt{2}\sin x - 1) = 0$$

$\sec x = 0$ undefined $\quad$ $\sqrt{2}\sin x - 1 = 0$

$$\sin x = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\boxed{x = \frac{\pi}{4}, \frac{3\pi}{4}}$$

(13) $3\tan^2\theta = 1$

$$\tan^2\theta = \frac{1}{3}$$

$$\tan\theta = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\boxed{\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}}$$

(14) $\sin \frac{5\pi}{12}$

$\sin\left(\frac{\pi}{6}+\frac{\pi}{4}\right)$

$\sin\frac{\pi}{6}\cos\frac{\pi}{4}+\cos\frac{\pi}{6}\sin\frac{\pi}{4}$

$\frac{1}{2}\cdot\frac{\sqrt{2}}{2}+\frac{\sqrt{3}}{2}\cdot\frac{\sqrt{2}}{2}$

$\boxed{\frac{\sqrt{2}+\sqrt{6}}{4}}$

(15) $\cos\frac{11\pi}{12}$

$\cos\left(\frac{\pi}{4}+\frac{2\pi}{3}\right)$

$\cos\frac{\pi}{4}\cos\frac{2\pi}{3}-\sin\frac{\pi}{4}\sin\frac{2\pi}{3}$

$\frac{\sqrt{2}}{2}\cdot\frac{-1}{2}-\frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2}$

$\boxed{\frac{-\sqrt{2}-\sqrt{6}}{4}}$

(16) $\sin^2 x+0.5=3\cos x$

$\sin^2 x-3\cos x+0.5=0$

$x=1.119101$ (by graphing)

$x=5.16408$ (")

(17) $x^2=10-\sin^4 x$

$x^2+\sin^4 x-10=0$

$x=3.16228$ (by graphing)

(18) $\sin 4\theta=2\sin 2\theta\cos 2\theta$

$2\sin 2\theta\cos 2\theta=2\sin 2\theta\cos 2\theta$

(Graphs of original are Identical)

(19) Graphs are not Identical, so $\csc x+\cot x \neq \frac{\sin x}{1+\cos x}$

(20) $\angle A=79°$ $\angle B=33°$ $a=7$

$\angle C=180-79-33 \boxed{=68°=\angle C}$

$\frac{\sin 79}{7}=\frac{\sin 33}{b}$

$b=\frac{7\sin 33}{\sin 79}=\boxed{3.88=b}$

$\frac{\sin 79}{7}=\frac{\sin 68}{c}$

$c=\frac{7\sin 68}{\sin 79}=\boxed{6.61=c}$

(21) $a=5$ $b=8$ $\angle B=30°$

$\frac{\sin A}{5}=\frac{\sin 30}{8}$

$\sin A=\frac{5\sin 30}{8}=0.3125$

$\boxed{\angle A=18.21°}$ or ~~$\angle A=161.79$~~

$\boxed{\angle C=131.79°}$ or ~~$\angle C=-11.79°$~~

$\frac{\sin 30}{8}=\frac{\sin 131.79}{c}$

$c=\frac{8\sin 131.79}{\sin 30}=\boxed{11.9295=c}$

22. $a=5,\ b=7,\ c=6$

$$a^2=b^2+c^2-2bc\cos A$$

$$\frac{a^2-b^2-c^2}{-2bc}=\cos A$$

$$\frac{5^2-7^2-6^2}{-2(7)(6)}=\cos A=\frac{5}{7}$$

$$\boxed{\angle A=44.4153^\circ}$$

23. $a=6 \quad b=7 \quad \angle A=30^\circ$

$$\frac{\sin 30}{6}=\frac{\sin B}{7} \qquad \sin B=\frac{7\sin 30}{6}=0.58$$

$$\boxed{\begin{array}{l}\angle B=35.6853^\circ \text{ or } \angle B=144.315^\circ\\ \angle C=114.315^\circ \text{ or } \angle B=5.68533^\circ\end{array}}$$

$$\frac{\sin 30}{6}=\frac{\sin 114.315}{c} \quad \text{or} \quad \frac{\sin 30}{6}=\frac{\sin 5.68533}{c}$$

$$c=\frac{6\sin 114.315}{\sin 30} \quad \text{or} \quad c=\frac{6\sin 5.68533}{\sin 30}$$

$$\boxed{c=10.9356 \text{ or } c=1.18878}$$

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1. $(4x-5y)^3$

1
1 1
1 2 1
1 3 3 1

$$(4x)^3+3\cdot(4x)^2(-5y)+3(4x)(-5y)^2+(-5y)^3$$

$$64x^3+3\cdot 16x^2\cdot -5y+12x\cdot 25y^2-125y^3$$

$$64x^3-240x^2y+300xy^2-125y^3$$

$$64-240+300-125$$

$$\boxed{-1}$$

2. $n_1=2$

$$n_{328}=2(328-1)+2=656$$

$$S_n=\frac{328}{2}(2+656)\boxed{=107{,}912}$$

3. $a_3=\frac{1}{3} \quad a_7=27$

$a_{10}=?$

$$a_3=a_1r^2 \qquad \frac{27=a_7}{\frac{1}{3}}=\frac{a_1r^6}{a_1r^2}$$

$$81=r^4$$

$$3=r$$

$$27=a_1(3)^6$$

$$a_1=\frac{27}{729}=\frac{1}{27}$$

$$a_{10}=\frac{1}{27}\cdot(3)^9$$

$$\boxed{a_{10}=729}$$

4. $10+4+\frac{8}{5}+\frac{16}{25}$

$$r=\frac{2}{5}$$

$$a_1=10$$

$$S=\frac{a_1}{1-r}=\frac{10}{1-2/5}=\frac{10}{3/5}=\boxed{\frac{50}{3}}$$

5. $a_4=1 \quad a_8=81$

$$a_4=1=a_1r^3 \qquad \frac{a_8}{a_4}=\frac{81}{1}=\frac{\cancel{a_1}r^7}{\cancel{a_1}r^3}$$

$$81=r^4 \quad r=3$$

$$81=a_1(3)^7 \Rightarrow a_1=\frac{81}{2187}=\frac{1}{27}$$

$$a_n=\frac{1}{27}(3)^{n-1}$$

(6) $\sum_{n=1}^{6} -3\left(\frac{1}{2}\right)^{n-1} =$

$-3\left(\frac{1-\frac{1}{2}^{6}}{1-\frac{1}{2}}\right) = -3\left(\frac{1-\frac{1}{64}}{\frac{1}{2}}\right) = \boxed{\frac{-189}{32}}$

(7) $a_2 = -5 \quad d = 4 \quad n = 47$

$a_1 = -5 - 4 = -9$

$a_{47} = 4(47-1) + -9 = \boxed{175}$

(8)

$$\begin{array}{c} 1 \\ 1 \quad 1 \\ 1 \quad 2 \quad 1 \\ 1 \quad 3 \quad 3 \quad 1 \\ 1 \quad 4 \quad 6 \quad 4 \quad 1 \\ 1 \quad 5 \quad 10 \quad 10 \quad 5 \quad 1 \\ 1 \quad 6 \quad 15 \quad 20 \quad 15 \quad 6 \quad 1 \\ 1 \quad 7 \quad 21 \quad 35 \quad 35 \quad 21 \quad 7 \quad 1 \end{array}$$

$35(5^3)(-x)^4$

$\boxed{4375x^4}$

(9) $f(4) = \frac{(4+2)!}{4!} = \boxed{30}$

$f(x) = \frac{(x+2)(x+1)(\cancel{x!})}{\cancel{x!}} = (x+2)(x+1)$

$f(4) = (4+2)(4+1) = \boxed{30}$

(10) $\sum_{n=1}^{9999} \log\frac{n}{n+1} = \log 1 - \log 2 + \log 2 - \log 3 + \ldots + \log\cancel{9999} - \log 10{,}000$

$= -4$

(11) $\sum_{x=1}^{79} \log_{\pi} x = 235.244$

(12) $\binom{14}{12} = 91$

$91 \cdot (1.5x)^2 \cdot (-2.1y)^{12}$

$\boxed{1506105.6829564x^2y^{12}}$

(13) $a_4 = -23 \quad a_8 = 95$

$a_4 = -23 = d(4-1) + a_1$

$-23 = 3d + a_1$

$a_8 = 95 = d(8-1) + a_1$

$95 = 7d + a_1$

$+23 = -3d - a_1$

$118 = 4d$

$d = 29.5$

$-23 = 3(29.5) + a_1$

$-111.5 = a_1$

$a_n = 29.5(n-1) + -111.5$

$\boxed{a_n = 29.5n - 141}$

$95 - 24 = 71$

(14) $\sum_{n=24}^{95} 1.6\left(\frac{2}{3}\right)^n = 0.000285$

by calc

$a_1 = 1.6\left(\frac{2}{3}\right)^{24} = 0.000095045107$

$\sum_{n=1}^{71} (0.000095)\left(\frac{2}{3}\right)^{n-1}$

$S_n = 0.000095\left(\frac{1-\left(\frac{2}{3}\right)^{71}}{1-\frac{2}{3}}\right) = 0.000285$

(15) $a_3 = \frac{25}{7}$ $\quad a_7 = \frac{15625}{16807}$

$a_3 = \frac{25}{7} = a_1 r^2$ $\quad \frac{a_7}{a_3} = \frac{\frac{15625}{16807} = a_1 r^6}{\frac{25}{7} = a_1 r^2}$

$\sqrt[4]{\frac{625}{2401}} = \sqrt[4]{r^4}$ $\quad \frac{25}{7} = a_1 \left(\frac{5}{7}\right)^2$

$r = 5/7$ $\quad a_1 = \frac{25/7}{25/49} = \boxed{7}$

$\boxed{a_n = 7\left(\frac{5}{7}\right)^{n-1}}$

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(1) $a = \langle -4, \frac{1}{2} \rangle \quad b = \langle \frac{2}{3}, -1 \rangle$

$4a - 3b = 4\langle -4, 1/2 \rangle - 3\langle \frac{2}{3}, -1 \rangle$

$= \langle -16, 2 \rangle + \langle -2, 3$

$= \langle -18, 5 \rangle$

$\boxed{-18i + 5j}$

(2) $\vec{PQ} = \langle 7+1, 2+2 \rangle = \langle 8, 4 \rangle$

$|\vec{PQ}| = \sqrt{8^2+4^2} = \sqrt{80} = 4\sqrt{5} = 8.94$

(3) $\langle -5, 4 \rangle$

(4) $\vec{u}_w = \frac{w}{|w|}$ $\quad |w| = \sqrt{15^2+8^2} = 17$

$\vec{u}_w = \langle -\frac{15}{17}, \frac{8}{17} \rangle$

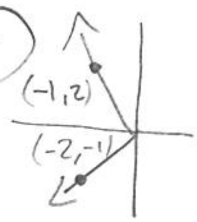
(5) $\vec{w} = \langle 9, 3 \rangle$

$|\vec{w}| = \sqrt{9^2+3^2} = \sqrt{90} = 3\sqrt{10}$

$u_{\vec{w}} = \langle \frac{9}{3\sqrt{10}}, \frac{3}{3\sqrt{10}} \rangle$

$\vec{u}_w = \langle \frac{3}{\sqrt{10}}, \frac{1}{\sqrt{10}} \rangle$

(6)



$\langle -1, 2 \rangle$ & $\langle -2, -1 \rangle$

$-1 \cdot -2 + 2 \cdot -1$

$2 - 2$

$\boxed{0}$

(7) $\langle \frac{2}{3}, -4 \rangle \cdot \langle -2, \frac{2}{5} \rangle$

$\frac{2}{3} \cdot -2 - 4 \cdot \frac{2}{5}$

$-\frac{4}{3} - \frac{8}{5} = -\frac{44}{15}$

(8) $\vec{u} = -5\hat{i} + 2j$

$\vec{v} = 7\hat{i} - 9\hat{j}$

$\vec{u} \cdot \vec{v} = -5 \cdot 7 + 2 \cdot -9$

$= -35 - 18 = \boxed{-53}$

(9) $W = F \cdot d$

$W = 585 \cdot 72 = 42120$ lb·ft

(10) $O=(11,-12)$ $P=(-5,4)$

$\overrightarrow{PO}=\langle 11+5, -12-4\rangle$

$\boxed{\overrightarrow{PO}=\langle 16,-16\rangle}$

(11) $\frac{1}{2}\vec{u}-6\langle -1,1\rangle=\langle 7,4\rangle$

$\frac{1}{2}\vec{u}+\cancel{\langle 6,-6\rangle}=\langle 7,4\rangle$

$\cancel{-\langle 6,-6\rangle}$ $\quad -\langle 6,-6\rangle$

$\frac{1}{2}\vec{u}=\langle 1,10\rangle$

$\boxed{\vec{u}=\langle 2,20\rangle}$

(12) $\tan^{-1}\left(\frac{-2}{7}\right)=-15.9454^\circ$

$+360$

$\boxed{344.055^\circ}$

(13) $|\vec{u}|=\sqrt{(-9)^2+(11)^2}=\sqrt{202}=14.2127$

$\vec{u}_v=\left\langle\frac{-9}{14.2127}, \frac{-11}{14.2127}\right\rangle$

$\boxed{\vec{u}_v=\langle -0.6332, -0.7740\rangle}$

(14) $\cos\theta=\frac{\vec{u}\cdot\vec{v}}{|\vec{u}||\vec{v}|}=\frac{\langle 6,-1\rangle\cdot\langle 2,12\rangle}{\sqrt{6^2+1^2}\cdot\sqrt{2^2+12^2}}$

$\cos\theta=\frac{12-12}{\sqrt{37}\cdot\sqrt{148}}=0$

$\cos\theta=0$

$\boxed{\theta=90^\circ}$

(15) $\cos\theta=\frac{\langle 2,2\rangle\cdot\langle -1,-4\rangle}{\sqrt{2^2+2^2}\cdot\sqrt{1^2+4^2}}$

$\cos\theta=\frac{-2+-8}{\sqrt{8}\cdot\sqrt{17}}=-0.857493$

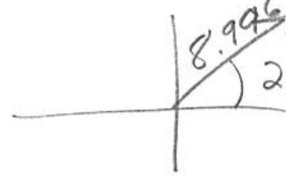
$\boxed{\theta=149.036^\circ}$

(16) ?? Bad Question

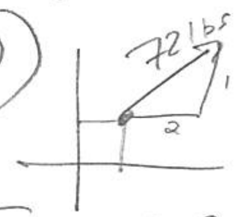
(17) $\vec{u}=\langle 8.2, 3.7\rangle$

$|\vec{u}|=\sqrt{8.2^2+3.7^2}=\boxed{8.99611}$

$\theta=\tan^{-1}\left(\frac{3.7}{8.2}\right)=\boxed{24.2858}$



(18)



$\theta=\tan^{-1}\left(\frac{1}{2}\right)$

$\theta=26.5651$

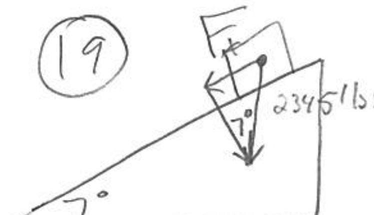
$F_x=72\cos 26.5651$

$F_x=64.3988$ lbs

$W=F\cdot d=5\cdot 64.3988$

$\boxed{W=321.994 \text{ lb}\cdot\text{ft}}$

(19)



$\sin 7^\circ=\frac{F_x}{2345}$

$2345\sin 7=F_x$

$\boxed{F_x=285.784 \text{ lbs}}$

20.

if $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

$$A^{-1} = \frac{1}{ad-bc}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$= \frac{1}{4(5)+2(1)}\begin{bmatrix} 5 & 2 \\ -1 & 4 \end{bmatrix} = \frac{1}{22}\begin{bmatrix} 5 & 2 \\ -1 & 4 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} \frac{5}{22} & \frac{1}{11} \\ \frac{-1}{22} & \frac{2}{11} \end{bmatrix}$$

21.

$$RREF\left(\begin{bmatrix} 1 & 0 & 1 & 1 & 2 \\ 1 & 1 & 1 & 0 & 3 \\ 3 & 2 & 3 & 1 & 8 \end{bmatrix}\right)$$

$x + z + w = 2 \Rightarrow x = 2 - z - w$

$y - w = 1 \qquad y = 1 + w$

$z = z$

$w = w$

$(2-z-w, 1+w, z, w)$

22.

$$RREF\left(\begin{bmatrix} 1 & 2 & 1 & -1 \\ 1 & -3 & 2 & 1 \\ 2 & -3 & 1 & 5 \end{bmatrix}\right)$$

$x = 9/4$, $y = -3/4$, $z = -7/4$

23.

$$\frac{-x+10}{(x+4)(x-3)} = \frac{A}{x+4} + \frac{B}{x-3}$$

$-x + 10 = Ax - 3A + Bx + 4B$

$x: -1 = A + B$

$1: 10 = -3A + 4B$

$$rref\left(\begin{bmatrix} 1 & 1 & -1 \\ -3 & 4 & 10 \end{bmatrix}\right)$$

$\Rightarrow A = -2 \quad B = 1$

$$\boxed{= \frac{-2}{x+4} + \frac{1}{x-3}}$$

(24) $$\frac{x^2-2x+1}{(x-2)^3} = \frac{A}{x-2} + \frac{B}{(x-2)^2} + \frac{C}{(x-2)^3}$$

$$x^2-2x+1 = Ax^2-4Ax+4A+Bx-2B+C$$

x^2: $1 = A$

x: $-2 = -4A + B$

c: $1 = 4A - 2B + C$

rref $\begin{bmatrix} 1 & 0 & 0 & 1 \\ -4 & 1 & 0 & -2 \\ 4 & -2 & 1 & 1 \end{bmatrix}$

$\Rightarrow A = 1 \quad B = 2 \quad C = 1$

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

(25)
$$\begin{aligned} 3.5r + 1.5c + 2l &= 50 \\ r + c + l &= 24 \\ 2r - c &= 0 \end{aligned}$$

$c = 2r$

$2r - c = 0$

rref$\left(\begin{bmatrix} 3.5 & 1.5 & 2 & 20 \\ 1 & 1 & 1 & 24 \\ 2 & -1 & 0 & 0 \end{bmatrix}\right)$

$r = 4 \quad c = 8 \quad l = 12$

(1) $\lim_{x\to 3} g(x) = 3$

(2) $g(1) = 4$

(5)

$\lim_{x\to 0} \sin\frac{\pi}{x} = \boxed{DNE}$

(6) $\lim_{x\to\infty} \sin\frac{\pi}{x} = \boxed{0}$

(7) $\lim_{x\to 0} \sin\frac{x}{x-1} = \sin\frac{0}{0-1} = \sin 0$

$\sin 0 = \boxed{0}$

(8) $\lim_{x\to\infty} \sin\frac{x}{x-1} = \lim_{x\to\infty} \sin\left(\frac{1}{1-\cancel{1/x}}\right) = \sin(1)$

$\sin(1) = \boxed{0.8415}$

(9) $\lim_{x\to 0} \sin\left(\sqrt{x} - 2\right)$

DNE

(10) $\lim_{x\to 0} \frac{x^2+x-12}{x+4} = -\frac{12}{4}$

$\boxed{= -3}$

(11) $\lim_{x\to -4} \frac{x^2+x-12}{x+4}$

$\lim_{x\to -4} \frac{\cancel{(x+4)}(x-3)}{\cancel{x+4}}$

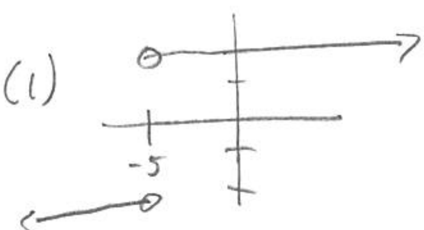
$\lim_{x\to -4} (x-3) = -4-3 \boxed{= -7}$

(12) $\lim_{x\to 5} \begin{cases} x+2, & x<5 \quad (=7) \\ 2-2x, & x\geq 5 \quad (= -8) \end{cases}$

$\boxed{DNE}$

(13) $\lim_{x\to 2} \frac{\sqrt{9}}{|-4|^2} = \boxed{\frac{3}{16}}$

(14) $\lim_{x\to -5^+} \frac{2|x+5|}{x+5} = 2$



(15) $\lim_{x\to 0} \frac{\sin 3x}{x} = \lim_{x\to 0} \frac{\sin(2x+x)}{x}$

$\lim_{x\to 0} \frac{\sin 2x\cos x + \sin x\cos 2x}{x}$

$\lim_{x\to 0} \frac{2\sin x\cos^2 x + \sin x\cos 2x}{x}$

$\lim_{x\to 0} \overset{1}{\cancel{\frac{\sin x}{x}}} \cdot \left(2\cos^2 x + \cos 2x\right)$

$= 1\cdot(2(1)+1) \boxed{= 3}$

(16) $\lim_{x \to 0} \dfrac{e^{x}-3}{x} = \boxed{DNE}$

(17) $\lim_{x \to 4} \dfrac{\frac{1}{4} - \frac{1}{x}}{x-4} = \lim_{x \to 4} \dfrac{\frac{x}{4x} - \frac{4}{4x}}{x-4} = \lim_{x \to 4} \dfrac{\frac{x-4}{4x}}{x-4}$

$\lim_{x \to 4} \dfrac{\cancel{x-4}}{4x} \cdot \dfrac{1}{\cancel{x-4}} = \lim_{x \to 4} \dfrac{1}{4x} = \dfrac{1}{4 \cdot 4} = \boxed{\dfrac{1}{16}}$

(18) $\lim_{x \to \infty} \dfrac{7x^2}{2x^2+7} = \lim_{x \to \infty} \dfrac{7}{2+\cancel{\frac{7}{x^2}}^{\,0}} = \dfrac{7}{2}$

(19) $\lim_{x \to \infty} \dfrac{x+3}{x^2-9} = \lim_{x \to \infty} \dfrac{\cancel{\frac{x}{x^2}}^{\,0} + \cancel{\frac{3}{x^2}}^{\,0}}{1 - \cancel{\frac{9}{x^2}}^{\,0}} = \dfrac{0}{1} \boxed{= 0}$