$\qquad$
Midterm Exam Prep Worksheet

1. Given $\csc (A)=-\frac{5}{4}$ in $Q$ III, and $(-2, \sqrt{5})$ is on the terminal side of $B$, find the exact values of: background info here)
$\angle A$

$$
\begin{aligned}
& r=5 \quad y=-4 \\
& x=-3
\end{aligned}
$$

$$
\sin A=-\frac{4}{5}\left(=\frac{y}{r}\right)
$$

$\cos A=-\frac{3}{5}\left(=\frac{x}{r}\right)$

$$
\begin{aligned}
\angle B \quad x & =-2 \quad y=\sqrt{5} \\
r & =3
\end{aligned}
$$

$$
\sin B=\frac{\sqrt{5}}{3}
$$

$$
\cos B=-\frac{2}{3}
$$

a. $\sin (A+B)=\sin A \cos B+\cos A \sin B$

$$
\begin{aligned}
& =\left(-\frac{4}{5}\right)\left(-\frac{2}{3}\right)+\left(-\frac{3}{5}\right)\left(\frac{\sqrt{5}}{3}\right) \\
& =\frac{8}{15}-\frac{3 \sqrt{5}}{15}=\frac{8-3 \sqrt{5}}{15}
\end{aligned}
$$

b. $\cos (A-B)=\cos A \cos B+\sin A \sin B$

$$
\begin{aligned}
& \left(-\frac{3}{5}\right)\left(-\frac{2}{3}\right)+\left(-\frac{4}{5}\right)\left(\frac{\sqrt{5}}{3}\right) \\
& \frac{6}{15}-\frac{4 \sqrt{5}}{15}=\frac{6-4 \sqrt{5}}{15}
\end{aligned}
$$

$$
\cos (A+B)=\cos A \cos B-\sin A \sin B
$$

$$
\left(-\frac{3}{5}\right)\left(-\frac{2}{3}\right)-\left(-\frac{4}{5}\right)\left(\frac{\sqrt{5}}{3}\right)=\frac{6+4 \sqrt{5}}{15}
$$

$$
\begin{aligned}
\sin (A-B) & =\left(-\frac{4}{5}\right)\left(-\frac{2}{3}\right)-\left(-\frac{3}{5}\right)\left(\frac{\sqrt{5}}{3}\right) \\
& =\frac{8}{15}+\frac{3 \sqrt{5}}{15}=\frac{8+3 \sqrt{5}}{15}
\end{aligned}
$$

2. Find the general solutions in degrees to the following equations:

$$
\cos A \cos B-\sin A \sin B=\cos (A+B)
$$

a. $\cos 30^{\circ} \cos \underline{2 x}-\sin 30^{\circ} \sin 2 x=\frac{1}{\sqrt{3}}$ for $x \in\{\operatorname{Re}$ als $\}$

$$
\begin{aligned}
& \cos (30+2 x)=\frac{1}{\sqrt{3}} Q I \text { and IV } \\
& 30+2 x=\cos ^{-1}\left(\frac{1}{\sqrt{3}}\right) \\
& 30+2 x=54.7356 \pm 360 n, 305.2644 \pm 360 n \\
& 2 x=24.7356^{\circ}, 275.2644 \\
& x=12.3678^{\circ} \pm 180 n \\
& \\
& 137.6322^{\circ} \pm 180 n
\end{aligned}
$$


b. $\cos x \sin 70^{\circ}-\sin x \cos 70^{\circ}=-\frac{1}{2}$ for $x \in\left\{0^{\circ}, 360^{\circ}\right\}$

$$
\begin{aligned}
& \sin (x-70)=-\frac{1}{2} \\
& x-70=210^{\circ}, 330^{\circ} \Rightarrow x=280^{\circ}, 400^{\circ}
\end{aligned}
$$

Jeff Mullen's fantasy league points have a week by week total shown below.
3. Make a stem-leaf plot of these values in the given space below.

| Week | Points |
| :---: | :---: |
| 1 | 35 |
| 2 | 73 |
| 3 | 72 |
| 4 | 59 |
| 5 | 63 |
| 6 | 81 |
| 7 | 84 |
| 8 | 73 |
| 9 | 75 |
| 10 | 64 |
| 11 | 83 |
| 12 | 93 |
| 13 | 81 |
| 14 | 83 |


4) Construct a histogram of the data above according to the labels on the $x$-axes. Label the $y$-axes accurately

5) On the axes below, draw a box plot of the data. Indicate the values of the five number summary


Indicate and justify any outliers in this data

$$
\begin{array}{ll}
35 \text { is an outlier becave... } & 1.5(I Q R)=28.5 \\
I Q R=Q 3-Q 1=83-64=19 & Q 1-35=64-35=29>28.5 \Rightarrow 35 \text { is an outlier }
\end{array}
$$

For this data, would the mean/standard deviation be a more appropriate measurement than the five-number summary? Explain your answer. You may use the calculator short cuts to mean/SD if necessary.

$$
\begin{aligned}
& \text { mean }=72.788 \\
& S D=14.343
\end{aligned}
$$

6) Take all the numbers from the box plot (including any outliers you may or may not have found) and calculate the standard deviation of those numbers showing all steps

$$
35,59,64,74,83,93
$$

| $x$ | $x-\bar{x}$ | $(x-\bar{x})^{2}$ |
| :--- | :--- | :--- |
| 35 | -33 | 1089 |
| 59 | -9 | 81 |
| 64 | -4 | 16 |
| 74 | 6 | 36 |
| 83 | 15 | 225 |
| 93 | 25 | 625 |

$$
\frac{\sum(x-\bar{x})^{2}}{n-1}=\frac{2072}{5}=414.4 \Rightarrow \sqrt{414.4}=20.357
$$

