

Math 125 Review Packet for the Common Final

Remarks:

- The final will not be identical to the questions in this packet.
- The final will be in the same format as this packet, but not as long.
- The use of any calculator, smart phone or other transmitting devices such as a smart watch is prohibited for the final.

1. Circle the correct answer: **T** (True) or **F** (False)

(a) **T** or **F** : $\frac{x}{x^2+3} + \frac{7}{6x-1}$ is simplified to $\frac{x+7}{x^2+6x+2}$.

(b) **T** or **F** : $\frac{x}{x^2+3}$ is simplified to $\frac{1}{x+3}$.

(c) **T** or **F** : If $x(x+1) > 0$, then x and $x+1$ are either both positive or both negative.

(d) **T** or **F** : $f^{-1}(f(x)) = x$ for every x in the domain of f .

(e) **T** or **F** : $\pi = 180$

(f) **T** or **F** : The angle $\frac{2\pi}{3}$ is coterminal the angle $\frac{\pi}{3}$.

(g) **T** or **F** : $\sin^{-1} x = \csc x$

(h) **T** or **F** : $\sin t \cos t > 0$ in the second quadrant.

(i) **T** or **F** : $\cos \frac{9\pi}{10} > 0$

(j) **T** or **F** : $\tan(-\theta) = -\tan \theta$

(k) **T** or **F** : $\sin(\theta + 2\pi) = \sin \theta$

(l) **T** or **F** : The period of $f(x) = \tan x$ is 2π

(m) **T** or **F** : $\sin^{-1} \left(\sin \frac{5\pi}{6} \right) = \frac{\pi}{6}$

(n) **T** or **F** : The amplitude of the graph of $y = -3 \sin \left(\frac{x}{2} \right)$ is -3 .

(o) **T** or **F** : $\sec \theta = \csc \left(\frac{\pi}{2} - \theta \right)$

(p) **T** or **F** : In triangle ABC , $\frac{\sin A}{a} = \frac{\cos B}{b} = \frac{\tan C}{c}$

(q) **T** or **F** : In triangle ABC , $a^2 = b^2 + c^2 - 2bc \cos A$

(r) **T** or **F** : The domain of the function $f(x) = e^x$ is all real numbers.

(s) **T** or **F** : The graph of the function $f(x) = \left(\frac{1}{3} \right)^x$ goes through the point $(1, 0)$.

(t) **T** or **F** : $\log(A + B) = \log A + \log B$, with $A > 0$ and $B > 0$

2. Fill in the blank.

(a) The graph of f^{-1} is obtained by reflecting the graph of f in the line _____

(b) The radian measure of the angle -330° is _____ $^\circ$

(c) The degree measure of the angle $\frac{11\pi}{3}$ is _____ .

(d) Find the radius of the circle if an arc of length 6 meters on the circle subtends a central angle of 135° : _____

(e) For the graph of the function $f(x) = 5 \sin(3x + \pi)$, the amplitude is _____ , the period is _____ and the phase shift is _____ .

(f) For the question (g), use the figure below to state the trigonometric ratios.

$\sin \theta =$ _____

$\cos \theta =$

 $\tan \theta =$ _____

$\csc \theta =$

 $\sec \theta =$ _____ $\cot \theta =$ _____

(g) Find the exact value: $\sin \frac{2\pi}{3} =$ _____

(h) Find the exact value: $\cos \frac{2\pi}{3} =$ _____

(i) Find the exact value: $\tan \frac{5\pi}{4} =$ _____

(j) $y = \cos^{-1} x \leftrightarrow x = \cos y$ for _____ $\leq x \leq$ _____ and _____ $\leq y \leq$ _____ $^\circ$

(k) Find the exact value: $\sin^{-1} \left(-\frac{\sqrt{2}}{2} \right) =$ _____

(l) Find the exact value: $\cos^{-1} \left(-\frac{\sqrt{2}}{2} \right) =$ _____

(m) Find the exact value: $\cos^{-1} \left(\cos \frac{5\pi}{6} \right) =$ _____

(n) Find the exact value: $\tan^{-1} \left(\tan \frac{5\pi}{6} \right) =$ _____

(o) Find the exact value: $\cos \left(\sin^{-1} \frac{3}{5} \right) =$ _____

(p) State the reciprocal identity: $\cot x =$ _____

(q) State the quotient identity: $\cot x =$ _____

(r) State the Pythagorean identity: $\sec^2 x =$ _____

- (s) State the addition formula: $\sin(x + y) = \underline{\hspace{2cm}}$
 (t) State the subtraction formula: $\cos(x - y) = \underline{\hspace{2cm}}$
 (u) State the three variations of the double-angle identity for cosine:

$$\cos 2x =$$

- $\underline{\hspace{2cm}}$
 (v) State the half-angle formula: $\sin \frac{x}{2} = \underline{\hspace{2cm}}$
 (w) Find all solutions of the equation $\tan x = \sqrt{3} : x = \underline{\hspace{2cm}}$
 (x) The graph of the function $f(x) = e^x - 2$ has a horizontal asymptote and it is $\underline{\hspace{2cm}}$.
 (y) Express the equation $\log_3 8 = x$ in exponential form: $\underline{\hspace{2cm}}$
 (z) The inverse of $f(x) = e^x$ is $f^{-1}(x) = \underline{\hspace{2cm}}$.
 (aa) $\log_a a^x = \underline{\hspace{2cm}}$ for $a > 0, a \neq 1$ and $x \in \mathfrak{R}$
 (bb) $a^{\log_a x} = \underline{\hspace{2cm}}$ for $a > 0, a \neq 1$ and $x > 0$
 (cc) Find the exact value: $\ln 1 = \underline{\hspace{2cm}}$
 (dd) Find the exact value: $\log 10 = \underline{\hspace{2cm}}$
 (ee) Find the exact value: $\log_2 160 - \log_2 5 = \underline{\hspace{2cm}}$
 (ff) Find the exact value: $\ln e^7 = \underline{\hspace{2cm}}$
 (gg) Expand: $\log \left(\frac{x^2 y}{\sqrt{x+1}} \right) = \underline{\hspace{2cm}}$
 (hh) Condense: $\ln(x + y) + \ln(x - y) - 3 \ln x = \underline{\hspace{2cm}}$

3. Perform the indicated operations and simplify.

- (a) $\frac{1}{x-1} + \frac{x}{(x-1)^2}$
 (b) $\frac{x^2+2x-3}{x^2+8x+16} \cdot \frac{x^2+4x}{x^2-1}$

4. Solve the equation.

- (a) $2x^3 - 3x^2 - 8x + 12 = 0$
 (b) $|2x + 3| = 9$
 (c) $\sin x - 2 \sin^2 x = 0$
 (d) $\sin x = \cos 2x$
 (e) $2^{3x-5} = 7$
 (f) $\log_2(1 - x) = 4$
 (g) $3^{2x} - 3^x - 6 = 0$
 (h) $\log x + \log(x + 1) = \log 12$

5. Solve the inequality.

- (a) $|2x - 5| \leq 3$
 (b) $|3x - 2| > 5$

6. Find the side labeled x or the angle labeled θ .

- (a) $x = \underline{\hspace{2cm}}$

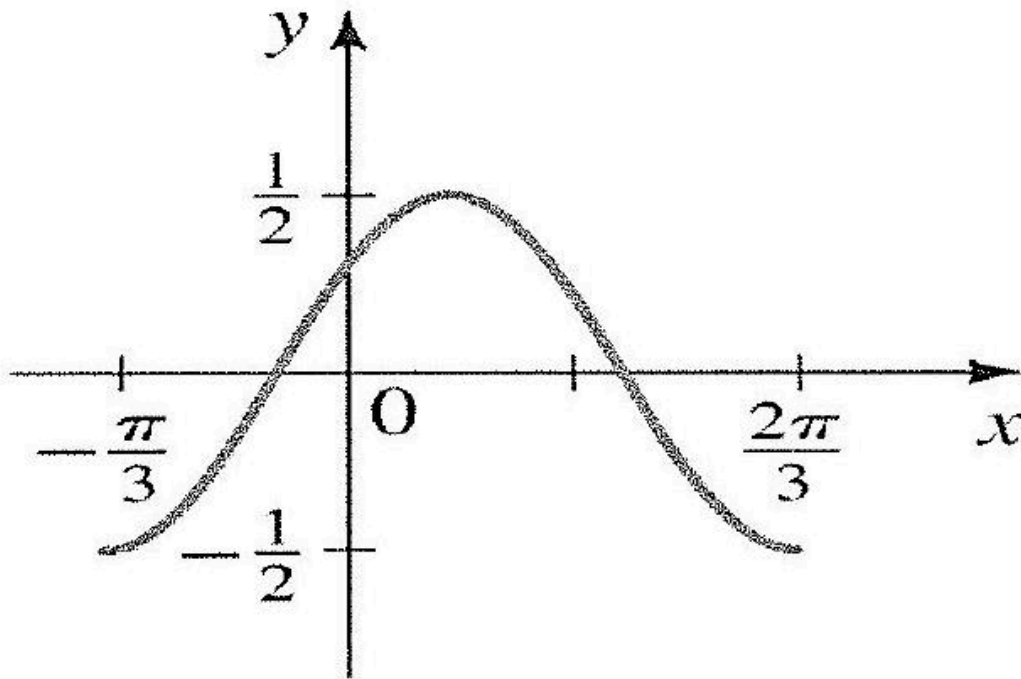
(b) $x = \underline{\hspace{2cm}}$

(c) $\theta = \underline{\hspace{2cm}}$

7. Find the amplitude, period and phase shift of the function and graph one complete period.

$$y = 2 \sin \left(x - \frac{\pi}{2} \right)$$

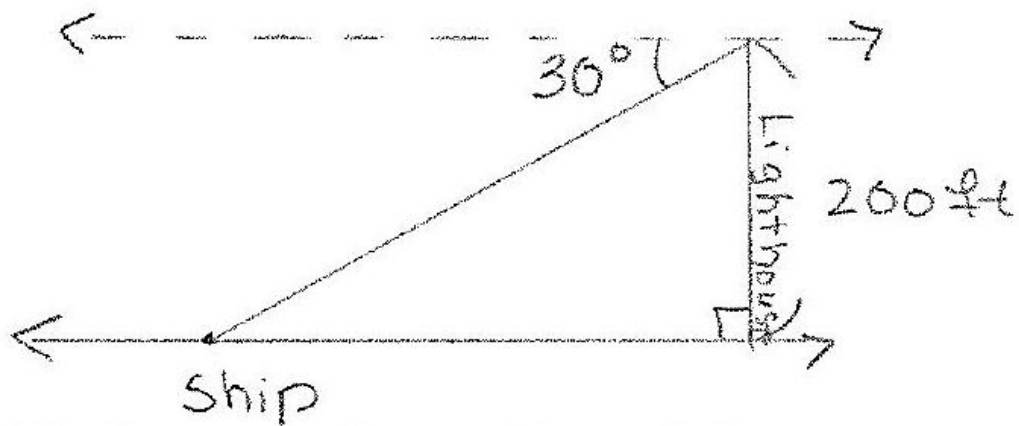
8. The graph of one complete period of a sine or cosine curve is given.



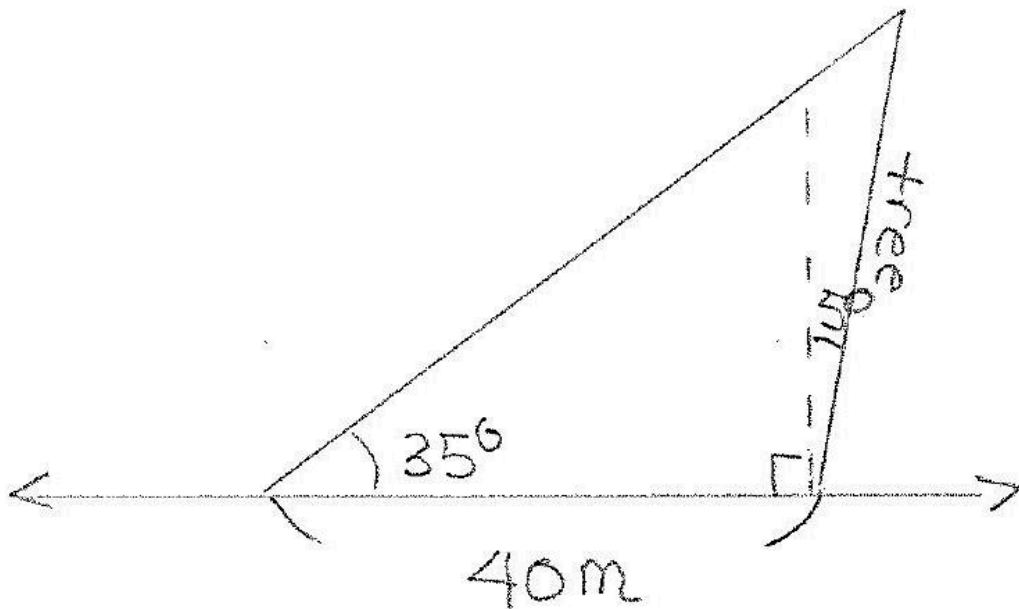
(a) Find the amplitude, period and horizontal shift.

(b) Write an equation that represents the curve in the form $y = a \sin k(x - b)$ or $y = a \cos k(x - b)$.

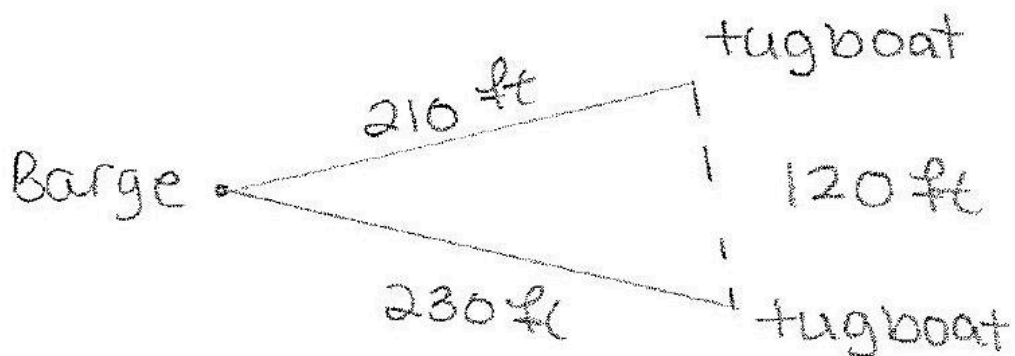
9. From the top of a 200 – ft lighthouse, the angle of depression to a ship in the ocean is 30° . How far is the ship from the base of the lighthouse?



10. Because of prevailing winds, a tree grew so that it was leaning 5° from the vertical. At a point 40 meters from the tree, the angle of elevation to the top of the tree is 35° . Find the height h of the tree.



11. Two tugboats that are 120 feet apart pull a barge, as shown. If the length of one cable is 210 feet and the length of the other is 230 feet, find the angle formed by the two cables.



12. Find $\sin 2x$ and $\cos 2x$ from the given information:

$$\tan x = -\frac{1}{3}, x \text{ in Quadrant II}$$

13. Verify the identity.

(a) $\cos^2 x \csc x - \csc x = -\sin x$

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

14. Sketch the graph of (a) $f(x) = 2^x$ and (b) $g(x) = 2^{-x}$.

15. Match the logarithmic function with its graph.

(i) $f(x) = \log_3(x - 1)$

(ii) $f(x) = -\log_3(x + 2)$

(iii) $f(x) = \log_3(1 - x)$

(iv) $f(x) = -\log_3(-x)$

(a)	(b)
(c)	(d)