Math 125 Review Packet for the Common Final

Remarks:

- Questions on the final will not be identical to questions in this review packet.
- The use of any calculator, smart phone and 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**: $\frac{x}{x^2+3}$ is simplified to $\frac{1}{x+3}$.

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

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

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

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

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

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

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

2. Choose the BEST answer.

(a) $\frac{x}{x^2+3}+\frac{7}{6x-1}=$ _____

A. $\frac{x+7}{x^2+6x+2}$

B. $\frac{13x^2-x+21}{(x^2+3)(6x-1)}$

C. $\frac{x+7}{(x^2+3)(6x-1)}$

D. None of them

(b) $\sin\theta\cos\theta > 0$ in the _____ quadrant.

A. I
B. II
C. I and III
D. II and IV
E. None of them

(c) The period of $f(x) = \cot x$ is _____.

A. π
B. 2π
C. 3π
D. None of them.

(d) The domain of $f(x) = \log x$ is_____.

A. $(-\infty, \infty)$
B. $(0, \infty)$
C. $[0, \infty)$
D. None of them

(e) The reference angle of $\frac{5\pi}{3}$ is _____.

A. $-\frac{\pi}{3}$
B. $\frac{2\pi}{3}$
C. $\frac{\pi}{3}$
D. None of them

3. Fill in the blank.

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

(b) The degree measure of the angle $\frac{7\pi}{6}$ _____.

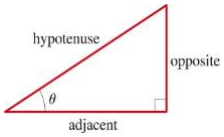
(c) Find the radius of the circle if an arc of length 6 meters on the circle subtends a central angle of

$135°$: _____

(d) For the graph of the function $f(x) = -2\sin(3x + \pi)$, the amplitude is _____, the period is

_____ and the horizontal shift is _____.

(e) Use the figure below to state the trigonometric ratios.



$\sin\theta =$ _____ $\cos\theta =$ _____

$\tan\theta =$ _____ $\csc\theta =$ _____

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

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

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

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

(i) $y = \cos^{-1} x \Leftrightarrow x = \cos y$ for _____ $\le x \le$ _____ and _____ $\le y \le$ _____ .

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

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

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

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

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

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

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

(q) State the addition formula: $\cos(x-y) =$ _____

(r) State the three variations of the double-angle identity for cosine:

$\cos 2x =$ _____

(s) State the half-angle formula: $\sin\frac{x}{2} =$ _____

(t) The graph of the function $f(x) = e^x - 2$ has a horizontal asymptote and it is _____.

(u) Express the equation $\log_3 8 = x$ in exponential form: _____

(v) $a^{\log_a x} =$ _____ for $a > 0$, $a \neq 1$ and $x > 0$

(w) Find the exact value: $\log_2 160 - \log_2 5 =$ _____

(x) Find the exact value: $\ln e^7 =$ _____

(y) Expand: $\log\left(\frac{x^2 y}{\sqrt{x+1}}\right) =$ _____

(z) Condense: $\ln(x+y) + \ln(x-y) - 3\ln x =$ _____

4. Perform the indicated operations and simplify.

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

5. 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) $\log x+\log(x+1)=\log 12$

6. Solve the inequality.

(a) $|2x-5|\le 3$ (b) $|3x-2|>5$ (c) $\frac{3x-1}{x-4}\le 2$

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

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

8. 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 light house?

9. Because of prevailing winds, a tree grew so that it was leaning $4°$ from the vertical. At a point 40 meters from the tree, the angel of elevation to the top of the tree is $35°$. Find the height *h* of the tree.

10. Two tugboats that are 120 feet apart pull a barge. 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.

11. Use the given information to answer the following questions. $\tan\theta=-\frac{1}{3}$, θ in Quadrant II

(a) Find $\sin\theta$.
(b) Find $\sec\theta$.
(c) Find $\sin 2\theta$.
(d) Find $\cos 2\theta$.

12. Verify the identity.

(a) $\cos^2 x\csc x-\csc x=-\sin x$ (b) $\dfrac{1}{1-\sin^2 x}=1+\tan^2 x$

13. Sketch the graphs of (a) $f(x)=2^x$ and (b) $g(x)=2^{-x}$.
14. Sketch the graphs of (a)$f(x)=\ln x$ and (b) $g(x)=\ln(x+1)$.