Math 130 Final Exam A – Spring 2007

Instructor's Name_____ Name_____
Section Number_____ Student ID_____

Multiple Choice. Circle the best answer for each question. Each problem is worth 2 points.

1. Simplify the expression $\left(3u^6v^6\right)^5\left(2u^6v^2\right)^{-3}$:

a) $\frac{243u^{12}v^{24}}{8}$ b) $\frac{8u^{12}v^{24}}{243}$ c) $\frac{81u^{13}v^{24}}{243}$ d) $\frac{1}{1944u^{12}v^{24}}$ e) none of these

2. Simplify the expression $\frac{1}{x+6}+\frac{1}{x+3}$:

a) $\frac{2x+3}{(x+6)(x+3)}$ b) $\frac{2x+9}{(x+6)(x+3)}$ c) $\frac{x^2+9}{(x+6)(x+3)}$ d) $\frac{2}{2x+9}$

e) none of these

3. For the function $f(x)=5x^2+8$, find $\frac{f(a+h)-f(a)}{h}$, $h\neq 0$.

a) $5h+20a$ b) $10h+5a$

c) $15h+10a$ d) $5h+5a$ e) none of these

4. If $f(x)=7x+63$, find the inverse function f^{-1},

a) $f^{-1}(x)=\frac{63-x}{7}$ b) $f^{-1}(x)=\frac{x-63}{7}$ c) $f^{-1}(x)=\frac{1}{7x+63}$

d) $f^{-1}(x)=\frac{7-x}{63}$ e) none of these

5. Find the quotient and remainder for $\frac{x^2+5x-19}{x+2}$:

a) $Q(x)=x+3, R(x)=3$ b) $Q(x)=x+3, R(x)=-25$ c) $Q(x)=x+3, R(x)=-28$

d) $Q(x)=x+7, R(x)=5$ d) none of these

6. Solve for x: $\log_3(7-x)=6$.

a) -729 b) -736 c) 736

d) -722 e) none of these

7. The point P is on the unit circle. The x-coordinate of P is $\frac{5}{7}$ and P is in quadrant IV. Find the y-coordinate of P.

a) $y = -\frac{5}{7}$ b) $y = \frac{5}{7}$ c) $y = -\frac{\sqrt{24}}{7}$ d) $y = -\frac{2}{7}$ e) none of these

8. Find the degree measure of the angle $-\frac{5\pi}{4}$ radians.

a) $-225°$ b) $-135°$ c) $-180°$ d) $-270°$ e) none of these

9. Find the exact value of the expression $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$.

a) $\frac{5\pi}{6}$ b) $\frac{\pi}{6}$ c) $-\frac{\pi}{6}$ d) $-\frac{5\pi}{6}$ e) none of these

10. Find all solutions of the equation $2\sin x + 1 = 0$.

a) $\frac{7\pi}{6} + 2\pi k,\ \frac{11\pi}{6} + 2\pi k$ b) $\frac{\pi}{6} + \pi k,\ \frac{5\pi}{6} + \pi k$ c) $\frac{\pi}{6} + 2\pi k,\ \frac{5\pi}{6} + 2\pi k$

d) $\frac{7\pi}{6} + \pi k,\ \frac{11\pi}{6} + \pi k$ e) none of these

<u>Problem Solving.</u> <u>Show all work to receive full credit. Each problem is worth 5 points.</u>

11. Factor the expression completely: $3x^2(x+2) - 4x(x+2)^2$

12. Find all real solutions: $\frac{x}{3} - \frac{4}{7-x} = 0$

13. Solve the inequality. Write the answer using interval notation. $\frac{4x-1}{x^2-9} \le 0$

14. Let P(-1, -5) and Q(2, -3) be two points in the coordinate plane.

a) Find the distance between P and Q.

b) Find the equation, in slope-intercept form, of the line that contains P and Q.

15. Let $f(x) = \begin{cases} x^2 & if \quad x \geq 1 \\ 2x+1 & if \quad x < 1 \end{cases}$

a) Fill in the blank: evaluate

$f(-2) =$ _____ and $f(3) =$ _____

b) Sketch the graph of *f*.

16. a) How is the graph of $g(x) = -|x-3|+1$ obtained from the graph of $f(x) = |x|$?

b) Graph the function $g(x) = -|x-3|+1$.

17. Sketch the complete graph of $f(x) = x^3 - 75x$. Find the exact values of all intercepts.

18. For the function $f(x) = \dfrac{3x^2 - x}{4x^2 - 4}$, find the exact values of

a) the equation(s) of any horizontal asymptote(s):_____

b) the equation(s) of any vertical asymptote(s): _____

c) the value(s) of any *x*-intercept(s): _____

d) the value(s) of any *y*-intercept(s): _____

19. Combine into a single logarithm and simplify your answer.

$\ln(x^2 - 4) - \dfrac{1}{2}\ln x - \ln(2 + x)$

20. Find either the exact solution or the decimal approximation, correct to four decimal places.

$6 - 3e^{-2x} = 0$

21. Let $t = -\dfrac{5\pi}{6}$. Find the exact value of each of the following:

a) the point $P(x, y)$ on the unit circle associated with *t*

b) $\cos t$

c) $\tan t$

d) $\sec t$

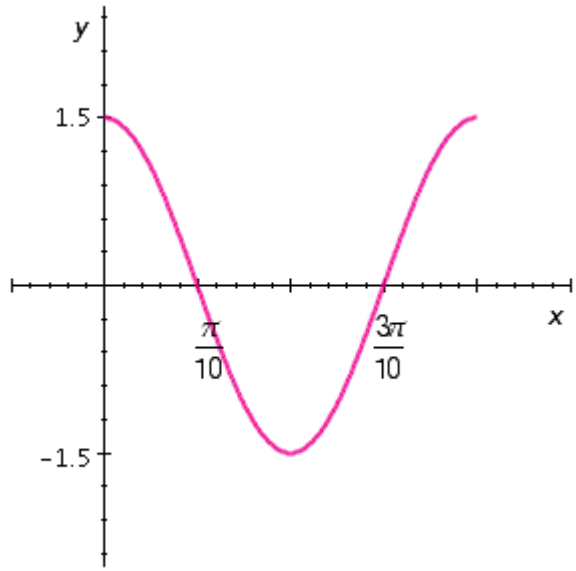
22. The graph below is one period of a function of the form $y = a\cos k(x-b)$. Find each:

a) amplitude _____

b) period _____

c) the function formula:

_____



You may find the following identities helpful:

$$\sin(s+t) = \sin s\cos t + \cos s\sin t, \quad \sin(s-t) = \sin s\cos t - \cos s\sin t$$
$$\cos(s+t) = \cos s\cos t - \sin s\sin t, \quad \cos(s-t) = \cos s\cos t + \sin s\sin t$$

23. If $\sin\theta = \frac{1}{3}$ and θ is in quadrant II, find each of the following:

a) the exact value of $\tan\theta$

b) the exact value of $\cos 2\theta$

24. Write the expression as a trigonometric function of one simplified quantity, then find the exact value:

$$\cos\frac{3\pi}{7}\cos\frac{2\pi}{21} + \sin\frac{3\pi}{7}\sin\frac{2\pi}{21}$$

25. Verify the identity: $1 + \frac{1}{2}\sec x = \frac{\sin x + \sin 2x}{\sin 2x}$.

26. Solve the equation in the interval $[0, 2\pi)$. Give exact values.

$4\sin^2 x - 3 = 0$