Fill in the blanks below with the exact values. **DO NOT USE A CALCULATOR.**
(NOTE: Not all boxes will have exact values. Leave those blank.)

$x =$	$-\sqrt{3}$	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{3}}{3}$	$-\frac{\sqrt{2}}{2}$	-1	$-\frac{1}{2}$	0	$\frac{1}{2}$	1	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{3}$	$\frac{\sqrt{3}}{2}$	$\sqrt{3}$
$\cos^{-1} x =$													
$\sin^{-1} x =$													
$\tan^{-1} x =$													

INSTRUCTIONS FOR USE (WORK WITH A STUDY GROUP):

Unless indicated with the notation **[CALCULATOR]**, all questions are strictly no-calculator.

[1] Print out the following list of questions.
[2] Cut along the lines so that each question is on a separate slip of paper.
[3] Throw all the slips of paper into a pile and mix.
[4] Pick a slip of paper randomly from the pile, and solve the corresponding question.
[5] After you have come up with your own solution, check against the solution manual.
The question number is indicated on the far right, and is based on the first edition textbook (on my website).
DO NOT CHECK UNTIL AFTER YOU HAVE YOUR OWN SOLUTION.
[6] **If you struggled a lot with the question, go back and study the corresponding section well.**
[7] Repeat steps [4]-[6] until you feel completely prepared for the final exam.

Find the coordinates of the point located three units behind the $yz-$plane, three units to the right of the $xz-$plane, and four units above the $xy-$plane. [__] 11.1 #7

Determine the octant(s) in which the point (x, y, z) is located if $xy < 0$. [__] 11.1 #15

Find the equation of the sphere with $(3, 0, 0)$ and $(0, 0, 6)$ as endpoints of a diameter. [__] 11.1 #45

Find the center and radius of the sphere $x^2 + y^2 + z^2 - 4x + 2y - 6z + 10 = 0$. [__] 11.1 #49

Use vectors to determine whether $(5, 4, 1)$, $(7, 3, -1)$ and $(4, 5, 3)$ are collinear. [__] 11.2 #31

Find a unit vector orthogonal to $3\vec{i} + \vec{j}$ and $\vec{j} + \vec{k}$. [__] 11.3 #15

Find parametric and symmetric equations for the line through the point $(2, -3, 5)$ and parallel to the line $x = 5 + 2t$, $y = 7 - 3t$, $z = -2 + t$. [__] 11.4 #5

Find parametric and symmetric equations for the line through the points $(3, 1, 2)$ and $(-1, 1, 5)$. [__] 11.4 #11

Find the general form of the equation of the plane through the point $(2, 0, 0)$ and perpendicular to the line $x = 3 - t,\ y = 2 - 2t,\ z = 4 + t$. [__] 11.4 #21

Find the general form of the equation of the plane through the points $(2, 3, -2)$, $(3, 4, 2)$ and $(1, -1, 0)$. [__] 11.4 #21

Determine whether the planes $5x - 3y + z = 4$ and $x + 4y + 7z = 1$ are parallel, orthogonal or neither. [__] 11.4 #29

Find the distance between the point $(4, -2, -2)$ and the plane $2x - y + z = 4$. [__] 11.4 #45

Write the corresponding rectangular equation for $\begin{array}{l} x = 2(t+1) \\ y = |t-2| \end{array}$. [__] 10.6 #11

Write the corresponding rectangular equation for $\begin{array}{l} x = 4 + 2\cos\theta \\ y = -1 + \sin\theta \end{array}$. [__] 10.6 #17

Find parametric equations for the circle with center $(3, 2)$ and radius 4. [__] 10.6 #31

Find two additional polar representations for the point $\left(4, -\frac{\pi}{3}\right)$ using $-2\pi < \theta < 2\pi$. [__] 10.7 #1

Convert the polar coordinates $\left(2, \frac{3\pi}{4}\right)$ to rectangular coordinates. [__] 10.7 #13

Convert the rectangular coordinates $(-\sqrt{3}, -\sqrt{3})$ to polar coordinates. [__] 10.7 #23

Convert $x^2 + y^2 - 2ax = 0$ to polar form. [__] 10.7 #47

Convert $r = \dfrac{2}{1 + \sin\theta}$ to rectangular form. [__] 10.7 #61

Test $r = \dfrac{2}{1 + \sin\theta}$ for symmetry with respect to $\theta = \frac{\pi}{2}$, the polar axis and the pole. [__] 10.8 #9

Graph $r = 1 - 2\sin\theta$ using symmetry, zeros, maximum r-values and quarter period points. [__] 10.8 #29

Identify (the type of) the conic $r = \dfrac{2}{2 - \cos\theta}$ and sketch its graph. [__] 10.9 #15

Identify (the type of) the conic $r = \dfrac{3}{2 + 4\sin\theta}$ and sketch its graph. [__] 10.9 #19

Find a polar equation of the parabola with its focus at the pole and its vertex at $\left(1, -\frac{\pi}{2}\right)$. [__] 10.9 #39

Find a polar equation of the hyperbola with its focus at the pole and its vertices at $\left(1, \frac{3\pi}{2}\right)$ and $\left(9, \frac{3\pi}{2}\right)$. [__] 10.9 #47

Find a general formula for the sequence $\frac{2}{1}, \frac{3}{3}, \frac{4}{5}, \frac{5}{7}, \frac{6}{9}, \cdots$. [__] 9.1 #43

Find the first five terms of the sequence defined recursively by $a_1 = 3, \quad a_{k+1} = 2(a_k - 1)$. [__] 9.1 #53

Simplify $\frac{(2n-1)!}{(2n+1)!}$. [__] 9.1 #71

Find $\sum_{k=2}^{5} (k+1)^2 (k-3)$. [__] 9.1 #81

Write $3 - 9 + 27 - 81 + 243 - 729$ using sigma notation. [__] 9.1 #93

Write $\frac{1}{4} + \frac{3}{8} + \frac{7}{16} + \frac{15}{32} + \frac{31}{64}$ using sigma notation. [__] 9.1 #97

Find the first five terms of the arithmetic sequence with $a_8 = 26$ and $a_{12} = 42$. [__] 9.2 #37

Find $\sum_{k=1}^{400} (2k-1)$. [__] 9.2 #73

Determine the seating capacity of an auditorium with 30 rows of seats if there are 20 seats in the first row, 24 seats in the second row, 28 seats in the third row, and so on. [__] 9.2 #83

Find the 6th term of the geometric sequence with $a_4 = -18$ and $a_7 = \frac{2}{3}$. [__] 9.3 #41

Find $\sum_{k=0}^{40} 2\left(-\frac{1}{4}\right)^k$. [__] 9.3 #67

Write $2 - \frac{1}{2} + \frac{1}{8} - \cdots + \frac{1}{2048}$ using sigma notation. [__] 9.3 #75

Find the sum of infinite series $8 + 6 + \frac{9}{2} + \frac{27}{8} + \cdots$. [__] 9.3 #89

Use Gauss-Jordan elimination (**<u>reduced</u>** row echelon form) to solve $\begin{aligned} x + 2y + z + 2w &= 8 \\ 3x + 7y + 6z + 9w &= 26 \end{aligned}$. [__] 8.1 #67

If $A = \begin{bmatrix} -2 & -1 \\ 1 & 0 \\ 3 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 3 \\ 2 & 0 \\ -4 & -1 \end{bmatrix}$, solve for X in the equation $2X + 3A = B$. [__] 8.2 #25

If $A = \begin{bmatrix} 0 & -1 & 0 \\ 4 & 0 & 2 \\ 8 & -1 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ -3 & 4 \\ 1 & 6 \end{bmatrix}$, find AB. [__] 8.2 #29

If $A = \begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}$, find A^2. [__] 8.2 #41

Find $\begin{vmatrix} 5 & 3 & 0 & 6 \\ 4 & 6 & 4 & 12 \\ 0 & 2 & -3 & 4 \\ 0 & 1 & -2 & 2 \end{vmatrix}$. [__] 8.4 #49

If $\begin{vmatrix} x-1 & 2 \\ 3 & x-2 \end{vmatrix} = 0$, find x. [__] 8.4 #75

Find $\begin{vmatrix} e^{2x} & e^{3x} \\ 2e^{2x} & 3e^{3x} \end{vmatrix}$. [__] 8.4 #81

Solve the system $\begin{matrix} -2x + y = -5 \\ x^2 + y^2 = 25 \end{matrix}$. [__] 7.1 #9

Find the partial fraction decomposition of $\dfrac{x^2}{x^4 - 2x^2 - 8}$. [__] 7.4 #33

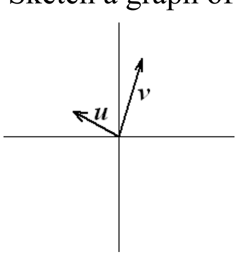
Find the partial fraction decomposition of $\dfrac{x^4}{(x-1)^3}$. [__] 7.4 #43

Sketch the solution set of $\begin{matrix} -3x + 2y < 6 \\ x - 4y > -2 \\ 2x + y < 3 \end{matrix}$ and find the vertices. [__] 7.5 #41

A coffee manufacturer sells a 10 pound package of coffee that consists of three flavors of coffee. vanilla-flavored coffee costs \$2 per pound, hazelnut-flavored coffee costs \$2.50 per pound, and mocha-flavored coffee costs \$3 per pound. The package contains the same amount of hazelnut coffee as mocha coffee. The cost of the 10 pound package is \$26. How many pounds of each type of coffee are in the package. [__] 7.3 #59

Use vectors to find the interior angles of the triangle with vertices $(1,2)$, $(3,4)$ and $(2,5)$. [__] 6.4 #39
[CALCULATOR]

Sketch a graph of $\vec{u} + 2\vec{v}$. [__] 6.3 #19



Find the vector with magnitude 9 in the direction of $< 2, 5 >$. [__] 6.3 #41

Find the magnitude and direction angle of $6\vec{i} - 6\vec{j}$. [__] 6.3 #55

Find the component form of $\vec{u}+\vec{v}$ if $\|\vec{u}\|=20$, $\theta_{\vec{u}}=45^\circ$, $\|\vec{v}\|=50$ and $\theta_{\vec{v}}=180^\circ$. [__] 6.3 #59

Find $\vec{u}\cdot\vec{v}$ if $\|\vec{u}\|=4$, $\|\vec{v}\|=10$ and $\theta=\dfrac{2\pi}{3}$. [__] 6.4 #43

Write $\vec{u}=<0,3>$ as the sum of two orthogonal vectors, one of which is $proj_{\vec{v}}\vec{u}$, where $\vec{v}=<2,15>$. [__] 6.4 #55

Find the standard form of $\dfrac{3}{2}cis300^\circ$. [__] 6.5 #33

Use DeMoivre's Theorem to find $(-1+i)^{10}$. [__] 6.5 #73

Prove the identity $\dfrac{\sin x\cos x}{\sin x-\cos x}=\cos x-\dfrac{\cos x}{1-\tan x}$. [__] 5.2

Solve $12\sin^2 x-13\sin x+3=0$. **[CALCULATOR]** [__] 5.3 #55

Simplify $\sec x\cdot\dfrac{\sin x}{\tan x}$. [__] 5.1 #35

Simplify $\cos\left(\dfrac{\pi}{2}-x\right)\sec x$. [__] 5.1 #37

Simplify $\tan^2 x-\tan^2 x\sin^2 x$. [__] 5.1 #45

Simplify $\dfrac{\cos x}{1+\sin x}+\dfrac{1+\sin x}{\cos x}$. [__] 5.1 #63

Use the substitution $x=5\tan\theta$ to rewrite the expression $\sqrt{x^2+25}$. [__] 5.1 #81

Simplify $\ln|\cot t|+\ln(1+\tan^2 t)$. [__] 5.1 #93

Solve $\sqrt{3}\csc x-2=0$. [__] 5.3 #9

Solve $\sec^2 x-\sec x=2$. [__] 5.3 #25

Solve $\cos\dfrac{x}{2}=\dfrac{\sqrt{2}}{2}$. [__] 5.3 #39

Find $\tan\dfrac{13\pi}{12}$. [__] 5.4 #19

Find $\cos 285^\circ$. [__] 5.4 #15

Find the exact value of $\sin\dfrac{\pi}{12}\cos\dfrac{\pi}{4}+\cos\dfrac{\pi}{12}\sin\dfrac{\pi}{4}$. [__] 5.4 #33

If $\sin u=\dfrac{5}{13}$ and $\cos v=-\dfrac{3}{5}$ and both u and v are in quadrant II, find the exact value of $\sec(v-u)$. [__] 5.4 #49

Find all solutions of $\sin\left(x+\frac{\pi}{3}\right)+\sin\left(x-\frac{\pi}{3}\right)=1$ in $[0, 2\pi)$. [__] 5.4 #69

Find the exact solutions of $\cos 2x - \cos x = 0$ in $[0, 2\pi)$. [__] 5.5 #13

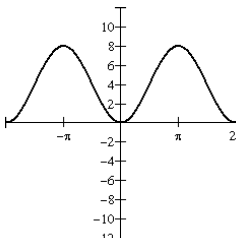
If $\sec u = -\frac{5}{2}$ and $\frac{\pi}{2} < u < \pi$, find $\tan 2u$ and $\sin 2u$. [__] 5.5 #27

Use the power reducing formulae to rewrite $\cos^4 x$ in terms of the first power of the cosine. [__] 5.5 #29

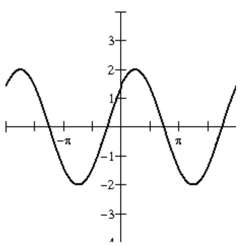
Graph $y = \frac{2}{3}\cos\left(\frac{x}{2}-\frac{\pi}{4}\right)$. [__] 4.5 #55

Graph $y = 2 - \sin\frac{2\pi x}{3}$. [__] 4.5 #49

Find a and d for the function $f(x) = a\cos x + d$ such that the graph of f matches the graph shown. [__] 4.5 #65



Find a, b and c for the function $f(x) = a\sin(bx - c)$ such that the graph of f matches the graph shown. [__] 4.5 #69



Graph $y = \sec \pi x - 1$. [__] 4.6 #15

Graph $y = \tan 3x$. [__] 4.6 #9

Find $\arcsin(\sin 3\pi)$. [__] 4.7 #47

Find $\sin\left[\cos^{-1}\left(-\frac{2}{3}\right)\right]$. [__] 4.7 #57

Find $\tan\left(\arccos\frac{x}{3}\right)$. [__] 4.7 #65
