MA 154 EXAM 3 FALL 1999

NAME_____

Circle the correct answer for problems 1-3. You must show your work to receive credit.

(8 pts) 1. If $\mathbf{a} = \langle -5,7 \rangle$ and $\mathbf{b} = \langle 2,-13 \rangle$, then $\mathbf{v} = 2\mathbf{a} - 3\mathbf{b}$ is:

A. $\langle -16,-25 \rangle$
B. $\langle -16,53 \rangle$
C. $\langle -16,-6 \rangle$
D. $\langle -4,53 \rangle$
E. $\langle -4,-25 \rangle$

(8 pts) 2. If $\mathbf{a} = 4\mathbf{i} - 3\mathbf{j}$ and $\mathbf{b} = -2\mathbf{i} + k\mathbf{j}$, then $\mathbf{a}$ and $\mathbf{b}$ are orthogonal if k is

A. -11
B. -5
C. 0
D. $\frac{8}{3}$
E. $-\frac{8}{3}$

(8 pts) 3. Compute: i^{49}

A. i
B. 1
C. $-i$
D. -1
E. None of these

NAME_____

Circle the correct answer for problem 4. You must show your work to receive credit.

(8 pts) 4. If $\mathbf{a} = \langle 1,2 \rangle$, $\mathbf{b} = \langle -2,3 \rangle$ and $\mathbf{c} = \langle -1,-2 \rangle$, then the dot product $\mathbf{a} \cdot (2\mathbf{b} - \mathbf{c})$ is

A. -13

B. 7

C. -19

D. 13

E. 3

Place your answers in the space provided. You must show your work to receive credit.

(10 pts) 5. Find an equation of a rational function, f, that satisfies the conditions

vertical asymptotes: $x = -2$, $x = \frac{5}{2}$; horizontal asymptote: $y = 0$

x-intercept: 1 $f(2) = -3$

$f(x) =$ [ ]

(10 pts) 6. If $\mathbf{a} = 7\mathbf{i} - 2\mathbf{j}$ and $\mathbf{b} = -3\mathbf{i} + 5\mathbf{j}$, determine the magnitude of the resultant.

Magnitude of Resultant = [ ]

NAME_____

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(12 pts) 7. Let $f(x) = \dfrac{3x^2 - 5x - 2}{12x^2 + x - 6}$. Find the following:

a) Vertical asymptote(s)

b) Horizontal asymptote(s)

c) x-intercept(s)

d) y-intercept(s)

(10 pts) 8. Two forces **a** and **b** of magnitudes 22 and 7 respectively act on a point. The direction of **a** is 125° and **b** is 65°, both measured from the x-axis in the positive direction. Approximate the magnitude, to the nearest tenth of a unit, and direction of the resultant, to the nearest degree.

Magnitude =

Direction =

NAME_____

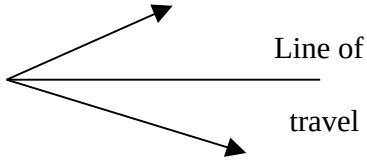
Place your answers in the space provided. You must show your work to receive credit.

(12 pts) 9. Bill pulls a rope attached to a small bin with a force of 115 lbs. The rope makes an angle of 35° with the ground. Find the horizontal and vertical components of the force. Round to the nearest tenth.

Horizontal Force = ☐

Vertical Force = ☐

(14 pts) 10. Two tugboats are towing a large ship through a narrow channel. The first tug exerts a force of 2750 pounds on its cable at an angle of 20° from the desired line of travel for the ship. The second tug exerts a force at an angle of 35° with respect to the line of travel. What force should the second tug exert if the ship is to travel in a straight line? Round your answer to the nearest 50 pounds.



Force = ☐