Math 151/171

- 1. Find $\mathbf{a} \cdot \mathbf{b}$
 - (a) $|\mathbf{a}| = 2$, $|\mathbf{b}| = 5$ and the angle between \mathbf{a} and \mathbf{b} is 150°
 - (b) $\mathbf{a} = -3\vec{\imath} + \vec{\jmath}, \ \mathbf{b} = 2\vec{\imath} + 4\vec{\jmath}$
- 2. Given the vectors $\mathbf{a} = < 1, -3 >$ and $\mathbf{b} = < -3, 4 >$. Find
 - (a) The scalar and vector projections of **a** onto **b**
 - (b) The scalar and vector projections of ${\bf b}$ onto ${\bf a}$
- 3. A boat sails south with the help of a wind blowing in the direction S36°E with magnitude 400 lb. Find the work done by the wind as the boat moves 110 ft. (Round your answer to the nearest whole number.)
- 4. Find, correct to the nearest degree, the angle B of the triangle with the vertices A(1,0), B(4,5), C(-1,2)
- 5. Find a unit vector orthogonal to the vector $\langle -2, 4 \rangle$.
- 6. Find the value(s) of x such that the vectors $x\vec{i} + 3x\vec{j}$ and $x\vec{i} 4\vec{j}$ are orthogonal.
- 7. Find the distance from the point (1,3) to the line 2x 3y 5 = 0.
- 8. Find the distance between the parallel lines y = 2x + 3 and y 2x = 9.
- 9. Find a Cartesian equation for the following parametric cu rves. Sketch the curve.
 - (a) $x = 1 t^2, y = 1 t, -1 \le t \le 1$
 - (b) $x = 1 + \sin t, y = 2 + \cos t$
 - (c) $x = \tan t, y = \cot^2 t, \frac{\pi}{6} \le t \le \frac{\pi}{3}$

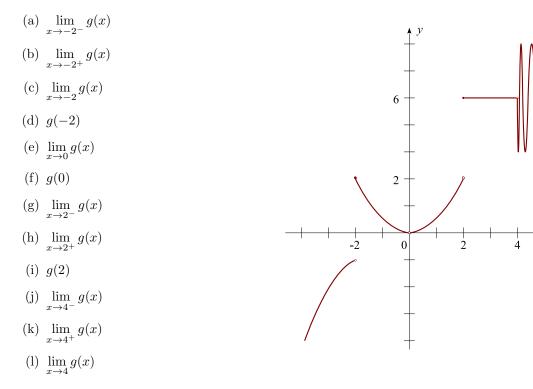
10. An object is moving in the xy-plane and its position after t seconds is $\mathbf{r}(t) = \langle t^2 + t, t - 4 \rangle$.

- (a) At what time is the object at the point (12,-1).
- (b) Does the object pass through the point (4,8)?
- (c) Find an equation in x and y whose graph is the path of the object.
- 11. Find a vector equation of the line containing the points (1,2) and (3,-4).
- 12. Find parametric equations of the line passing through the point (-1,1) and parallel to the vector $\vec{i} 5\vec{j}$.
- 13. Determine whether the lines $\mathbf{r}(t) = (-4+2t)\vec{\imath} + (5+t)\vec{\jmath}$ and $\mathbf{r}(t) = (2+3t)\vec{\imath} + (4-6t)\vec{\jmath}$ are parallel, perpendicular or neither. If they are not parallel, find their point of intersection.
- 14. Find all holes and vertical asymptote(s) for the graph of

$$g(x) = \frac{(x^2 + 5x)(x - 2)}{(x + 1)(x^2 + 4x - 5)}$$

and determine the behavior of the function near the vertical asymptotes.

15. For the function g whose graph is given, state the value of the given quantity, if it exists.



x