1 Section 1.2

1. Find $a \cdot b$ if $a = \langle 1, -1 \rangle$ and $b = i + 2j$.

2. Find $a \cdot b$ for the figure below, given $u$ is a unit vector.

3. Find the angle between the vectors $\langle 3, 1 \rangle$ and $-2i + 4j$.

4. Find $x$ such that the vectors $xi + j$ and $(4 + x)i + 3j$ are orthogonal.

5. Given $a = \langle 4, 5 \rangle$ and $b = \langle 1, -2 \rangle$ find the scalar and vector projections of:
   a) $b$ onto $a$
   b) $a$ onto $b$

6. A 10-kg block slides down a ramp which is 5m tall and 8m long. Find the work done by gravity if the block slides (friction-free) all the way down the ramp.

7. Find the distance from the point $(1, 5)$ to the line $2x - 3y = 12$.

2 Section 1.3

1. Find the Cartesian equation of the curve parametrized by $x = \sqrt{t}$, $y = 2t + 4$ and sketch the graph.

2. Given $r(t) = (t^{1/2} + 1)i + t^{3/2}j$:
   a) Find $r(1)$ and $r(t + h)$
   b) When (if at all) does the graph pass through the point $(3, 8)$?
   c) Eliminate the parameter and sketch the graph.

3. Describe the motion of a particle whose position is given by $x = -4\cos t$, $y = 3\sin t$.

4. Find vector and parametric equations of the line passing through the points $(-4, 2)$ and $(2, 14)$.

5. Determine whether the lines $r_1(t) = (3 - 4t)i + (4 + 3t)j$ and $r_2(t) = (2 - 5t)i + (5 - 3t)j$ are parallel, perpendicular, or neither. If not parallel, find their point of intersection.

6. A water balloon is thrown with initial velocity of 15 meters per second at an angle of elevation of 30°. Soon you will be able to derive the following parametric equations for the motion of the balloon: $x = \frac{15\sqrt{3}}{2}t$, $y = \frac{15}{2}t - 4.9t^2$. Determine how far away the balloon will strike the ground and find the Cartesian equation for the balloon’s motion.

7. How, if at all, does the graph of the function $r(t) = ti + (t - 1)^3j$ differ from the graph of #2?
3 Section 2.2

1. Use a computational device to estimate \( \lim_{x \to 0} \frac{2^x - 1}{x} \).

2. Determine \( \lim_{x \to 1} \frac{x^2 + 1}{x - 1} \) or show the limit Does Not Exist.

3. Determine \( \lim_{x \to 3} \frac{x^2 + 1}{(x - 3)^2} \) or show the limit Does Not Exist.

4. Find the vertical asymptotes of \( f(x) = \frac{x^2 - 4}{(x - 1)(x - 2)(x - 3)(x - 4)} \).