

Math 1A: Assignment 2 (25 points)

Due by the time you take Exam II – Late Assignments will not be accepted.

There are 2 pages to this assignment

- Do all work on a separate sheet of paper.
- You must show work to receive credit.
- Turn in work in order (#2 should come after #1, etc.)
- You may work in groups of up to 3 people. Points will be taken off, if more than 3 names are on one assignment.

1. (6 points) The position of a moving object, in meters, after t seconds, is given by:

$$s(t) = 4t^3 - 30t^2 + 27t \text{ meters.}$$

- When is the object at rest?
 - When is the object moving forward and backward?
 - What is the acceleration of the object at exactly 6 seconds?
 - What is the total distance the object travels in 12 seconds?
 - When is the object speeding up? Slowing down? *Hint: an object speeds up when its acceleration and velocity have the same sign.*
2. (2 points) When does the curve $y = 3x - 6e^x$ have a slope parallel to $y = -4x$? Perpendicular to $y = -4x$?
3. (3 points) At what points on the circle $x^2 - 4x + y^2 + 6y = 3$ is the slope of the tangent line -3 ?
4. (2 points) Find the equation of the line tangent to the parametric curve $x(t) = 2t^2 - 7t$;
 $y(t) = -4t^2 + 3t$ at the point $(-6, -10)$.
5. (7 points) Find the derivatives of the following:

a. $g(r) = \sqrt{\left(\frac{e^r - 4r^2}{3r}\right)}$

b. $\frac{d}{dx} \left[\ln \left(\frac{\sqrt{3x^3 - 5x}}{8x^4 - 6x} \right) \right]$

c. $y = \sin(\cos x) \cdot \sin^{-1}(\cos x)$

d. $\tan(3x + 5y^2) = 4x^5y + e^{-xy}$

e. $y = (6x^2 - 3x)^{5x}$

6. (3 points) On December 15, the local patrol spot Amine, as he attempts to steal the Math 1A Final from Mr. Shirley's office. They see him during their routine helicopter air patrol. The helicopter is moving vertically upward, at 10 ft/sec. The spotlight under the helicopter creates a 60-degree angle, when it shines directly down to the ground. How fast is the spotlight's area (on the ground) changing, when the helicopter is 400 feet in the air? (*Written by Jen Hsu – Fall 2004*)

7. (4 points) Two graphs are shown below. Find the following:

- $a'(-2)$; where $a(x) = f(x) + g(x)$
- $b'(-2)$; where $b(x) = f(x) \cdot g(x)$
- $c'(-2)$; where $c(x) = f(g(x))$

