1. Find two functions f and g so that the given function is the composition of f and g.

a) y = $(x^3 \; - \; 7x)^5$ b) y = $\sin^4(3x - 8)$ c) y = ($(2 \; + \; sin(x))^5$

2. Find the derivatives of the following functions.

a) f(x) = $-2x^2$ + 6 b) f(x) = $\dfrac{5\cos(3x)}{x^2+2}$ c) $f(x) = e^{x^2}$

3. Let f(x) = (x − 1)(x − 3) = x^2 − 4x + 3.

Use the definition of the derivative to find f ′ (2)

4. Determine D(e^{3x}· sin(5x + 7)) and d /dx (cos(x · e^x)).

5. Given that D(arcsin(x)) = $\frac{1}{\sqrt{1-x^2}}$, compute the derivatives D(arcsin(5x)) and $\frac{d}{dx}$(arcsin(x^2)

6. For each function in problems a-c , write y as a function of u for some u

that is a function of x.

a. y = $(x^3 \; - \; 7x)^{\,5}$ b. y = $\sin^4(3x - 8)$ c. y = $(2 \; + \; sin(x))^5$

7. If two functions are equal, then their derivatives are also equal. In a,b differentiate each side of the trigonometric identity to get a new identity.

a. sin^2(x) = 1/ 2 − 1 /2 cos(2x) b. cos(2x) = cos^2 (x) − $sin^{\,2}$(x)

8. For problems a-c, calculate y’ = $\frac{dy}{dx}$:

a. y = Ax^3 − B b. y = e^{Ax}+ e^{-Ax} c. y = cos(Ax + B)

9. In problems a- c , calculate f’ (x) · x’ (t) when t = 3 and use these values to determine the value of $\frac{d}{dt}$(f(x(t))) when t = 3.

a. f(x) = cos(x), x = t^2 − t + 5 b. f(x) e^x, x = sin(t) c. f(x) = $\sqrt{x}$, x = 2 + $\frac{21}{t}$

10. Determine whether the following statements are true or false.

a. $\lim_{x \to 2}(x^2 + x - 2) = 10$

b. f(x) is continuous at 1.

$$f(x) = \begin{cases} 1 - x & x < 1 \\ x^2 - 2x + 1 & x \geq 1 \end{cases}$$

c. f(x) is differentiable at -1

$$f(x) = \begin{cases} -2x & x < -1 \\ x^2 & x \geq -1 \end{cases}$$