

1. Given the following information, find the values of the remaining trigonometric functions.

$$\tan \theta = 3, \quad \pi < \theta < \frac{3\pi}{2}.$$

2. Solve the following equations for x .

(a). $2 \sin^2 x - \sqrt{2} \sin x = 0$ (x in $[0, 2\pi]$)

(b). $\cos\left(\frac{x}{2}\right) = 0$ (x in $[0, 2\pi]$)

3. Given $\theta = \frac{3\pi}{4}$, find $\sin 2\theta$.

4. Differentiate the following using Differentiation Rules.

(a). $y = 10x^3 - 3x + 7$

(b). $f(x) = \pi^2$

(c). $y = (3x)^3$

(d). $y = \frac{x + 4x^3 - 3}{x^3}$

(e). $s(t) = t^2(3t - 4t^3)$

(f). $f(x) = \frac{3}{x^2} - \sqrt{x}$

(g). $s(t) = (3t^3 - t^2 + 7)^{23}$

(h). $f(\theta) = \theta \sin(\theta^2 + 1)$

(i). $y = \frac{x(2x^4 + 4)^8}{\tan 2x}$ [Do not simplify!]

5. Find the equation of the tangent line to the curve $y = \sqrt[3]{2x^2 - 5}$ at $x = 4$.

6. Given $f(x) = g(3x^2)$, find f' in terms of g' .

7. A tank holds 1000 gallons of water, which drains from the bottom of the tank in 50 minutes. Torricelli's Law gives the volume V of water remaining in the tank after t minutes as $V = 1000 \left(1 - \frac{1}{50}t\right)^2$ for $0 \leq t \leq 50$. Find the rate at which the water is draining from the tank after 10 minutes. Include units in your answer.

8. If a stone is thrown vertically upward on the moon with a velocity of 8 m/s, its height after t seconds is given by $y = 8t - 0.83t^2$, [Calculator*]

- (a). What is the velocity after 2 s? (b). What is the velocity at impact?

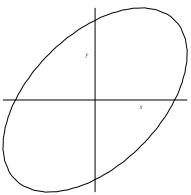
9. The cost function for a certain commodity is $C(x) = 60 + 0.12x - 0.0004x^2 + .000002x^3$. [Calculator*]

- (a). Find the marginal cost function.
 (b). Find and interpret $C'(50)$.
 (c). Compare $C'(50)$ with the cost of producing the 51st item.

10. Any Section 2.7 applications.

11. Given the curve drawn below and defined by $x^2 + y^2 = 3 + xy$

- (a). Find $\frac{dy}{dx}$
 (b). On the graph below, sketch any tangents lines to the curve where the slope is 0.
 (c). Use part (a) to find these points on the curve where the slope is 0. Must show work for credit.
 (d). Find $\frac{d^2y}{dx^2}$ in terms of x and y .



[The problem below is from Section 2.9, which will be covered on Tuesday.]

12. Given $f(x) = \sqrt{x} = x^{1/2}$

- (a). Find the linearization $L(x)$ at $a = 25$
 (b). Use this linearization $L(x)$ to approximate $\sqrt{24.7}$ [Simplify your answer.]
 (c). Find the differential dy for x going from 25 to 25.5.

*Similar non-calculator problems could be given.