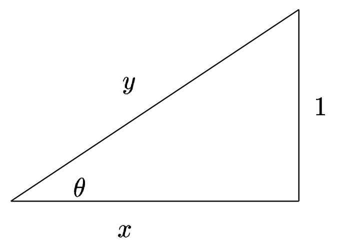
Solutions to Assignment #8

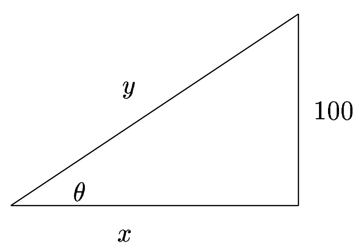
4.1 #14 (5 pts)



Now we know $\frac{dy}{dt} = -1\frac{\text{m}}{\text{sec}}$.
Find $\frac{dx}{dt}$ when $x = 8$.

$$x^2 + 1^2 = y^2$$
$$2x\frac{dx}{dt} + 0 = 2y\frac{dy}{dt}$$
$$\text{where } 8^2 + 1^2 = y^2 \Rightarrow y = \sqrt{65}$$
$$\text{So } 2(8)\frac{dx}{dt} = 2(\sqrt{65})(-1)$$
$$\frac{dx}{dt} = -\frac{\sqrt{65}}{8} \approx -1.01\frac{\text{m}}{\text{sec}}$$

4.1 #22 (5 pts)



Now we know $\frac{dx}{dt} = 8\frac{\text{ft}}{\text{sec}}$.
Find $\frac{d\theta}{dt}$ when $y = 200$ ($x = 100\sqrt{3}$)

$$\tan(\theta) = \frac{100}{x}$$
$$\sec^2(\theta)\frac{d\theta}{dt} = \frac{-100}{x^2}\frac{dx}{dt}$$
$$\left(\frac{200}{100\sqrt{3}}\right)^2\frac{d\theta}{dt} = \frac{-100}{(100\sqrt{3})^2}8$$
$$\frac{d\theta}{dt} = \frac{-1}{50}\frac{\text{radians}}{\text{sec}}$$

4.2 #40 (3 pts)

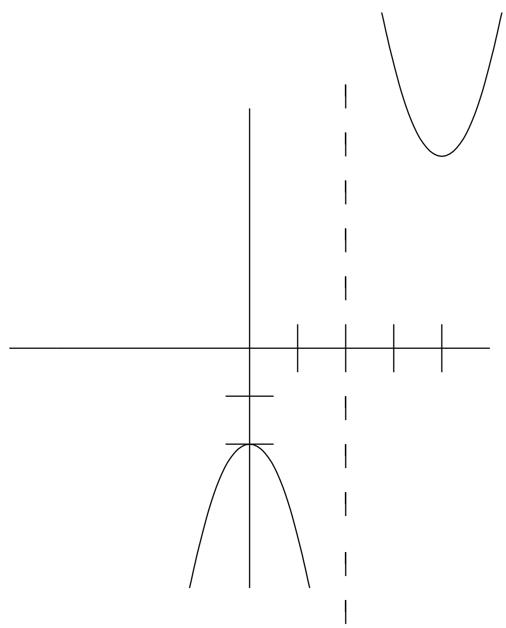
$$f'(x) = \frac{4 - x^2}{(x^2+4)^2}$$

Therefore our critical numbers are $x = 2,$ and $x = -2$.

$$f(0) = 0 \leftarrow \text{ Absolute minimum}$$
$$f(3) = \frac{3}{13}$$
$$f(-2) \text{ Not on Inverval}$$
$$f(2) = \frac{1}{4} \leftarrow \text{ Absolute maximum}$$

Worksheet #5 (6 pts)

Asymptotes: $x = 2$
Intercepts: $(0, -2)$
Critical #'s : $x = 0, x = 4, x = 2$
Increasing: $(-\infty, 0), (4, \infty)$
Decreasing: $(0, 2), (2, 4)$
Maximum: $(0, -2)$
Minimum: $(4, 6)$
Possible inflection points: $x = -2$
Concave up: $(2, \infty)$
Concave down: $(-\infty, 2)$
Inflection points: None



Worksheet #6 (6 pts)

Asymptotes: None
Intercepts: $(0, 0)$
Critical #'s : $x = \frac{2\pi}{3}, x = \frac{4\pi}{3}$
Increasing: $(0, \frac{2\pi}{3}), (\frac{4\pi}{3}, 2\pi)$
Decreasing: $(\frac{2\pi}{3}, \frac{4\pi}{3})$
Maximum: $(\frac{2\pi}{3}, \frac{2\pi}{3} + \sqrt{3})$ or $(\frac{2\pi}{3}, 3.83)$

Minimum: $(\frac{4\pi}{3}, \frac{4\pi}{3} - \sqrt{3})$ or $(\frac{4\pi}{3}, 2.46)$
Possible inflection points: $x = \pi$
Concave up: $(\pi, 2\pi)$
Concave down: $(0, \pi)$
Inflection points: (π, π)