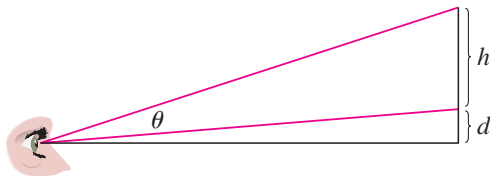


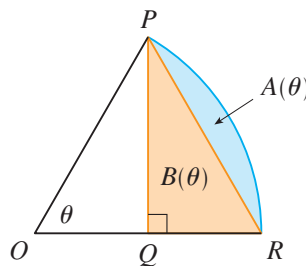
Written Homework 1

§6.6-8, 7.1-4

Due Tuesday 9/27



(a) Question 1



(b) Question 2

- (10 points) A TV screen with height h is positioned on a wall so that its lower edge is a distance d above the eye of an observer when seated. How far from the wall should the observer sit to get the best view? That is, how far from the wall should the observer sit so as to maximize the angle θ ?
- (10 points) The figure shows a sector of a circle with central angle θ . Let $A(\theta)$ be the area of the region between the chord PR and the arc PR . Let $B(\theta)$ be the area of the triangle PQR . Find the limit

$$\lim_{\theta \rightarrow 0^+} \frac{A(\theta)}{B(\theta)}.$$

- The [Fresnel function](#)

$$S(x) = \int_0^x \sin\left(\frac{\pi}{2}t^2\right) dt$$

arises in the study of the diffraction of light waves.

- (8 points) Evaluate $\lim_{x \rightarrow 0} \frac{S(x)}{x^3}$.

- (8 points) Use integration by parts to show that

$$\int S(x) dx = xS(x) + \frac{1}{\pi} \cos\left(\frac{\pi}{2}x^2\right) + C.$$

- Evaluate the following integrals.

- (8 points) $\int_0^a x^2 \sqrt{a^2 - x^2} dx$

- (8 points) $\int \frac{x^3 + 6x - 2}{x^4 + 6x^2} dx$

- (8 points) $\int \frac{x^3 - 4x - 1}{x^2 - 3x + 2} dx$

- (8 points) $\int \sec^3 x dx$

- Use the table of values below to approximate $\int_0^6 f(x) dx$

x	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
$f(x)$	2	8	9	3	3	0	1	3	-6	2	-2	-6	4

- (8 points) using the trapezoid rule with $n = 3$
 - (8 points) using Simpson's rule with $n = 4$
- (8 points) Sketch the graph of a continuous function on $[0, 2]$ such that the Trapezoid rule is more accurate than the Midpoint Rule, with $n = 2$.
 - (8 points) Sketch the graph of a continuous function on $[0, 2]$ such that the right endpoint approximation is more accurate than Simpson's Rule, with $n = 2$.