Fall 2011
Precalculus
Project E
Some calculus

Let $F(x) = \sin x$

1. Compute
$$D(h) = \frac{F(\pi + h) - F(\pi)}{h}$$

2. Using your calculator, complete the following table

$$D(0.1)$$
$$D(0.01)$$
$$D(0.001)$$
$$D(0.0001)$$
$$D(0.00001)$$

3. Which value is D getting close to as h is approaching zero? Compare your results with $\cos(\pi)$

4. Compute
$$Q(h) = \frac{F(\pi/2 + h) - F(\pi/2)}{h}$$

5. Using your calculator, complete the following table

$$Q(0.1)$$
$$Q(0.01)$$
$$Q(0.001)$$
$$Q(0.0001)$$
$$Q(0.00001)$$

6. What value is Q getting close to as h is approaching zero? Compare your results with $\cos(\pi/2)$

7. Compute
$$R(h) = \frac{F(\pi/4 + h) - F(\pi/4)}{h}$$

8. Using your calculator, complete the following table

$$R\left(0.1\right)$$
$$R\left(0.01\right)$$
$$R\left(0.001\right)$$
$$R\left(0.0001\right)$$
$$R\left(0.00001\right)$$

9. What value is R getting close to as h is approaching zero? Compare your results with $\cos\left(\pi/4\right)$

10. In general, what kind of conjecture can we make for the value of

$$D\left(h\right) = \frac{\sin\left(x+h\right) - \sin\left(x\right)}{h}$$

as h is getting closer to 0.