**Trig Equations**

Solve each of the following.

**1.** $4\cos\left(\frac{t}{3}\right)+1=0$

**2.** $4\cos\left(\frac{t}{3}\right)+1=0$ on the interval [-15, 25].

**3.** $7\sin\left(6x\right)+4=0$ on the interval [0, 2].

**4.** $9\sin\left(2x\right)+1=4$ on the interval [-5, 1].

**Exponential and Logarithm Equations**

Solve each of the following.

**5.** $10\mathbf{e}^{1-x^2}-3=0$

**6.** $x^2-3=\left(3x^2-9\right)\mathbf{e}^{7x-2}$

**7.** $\ln\left(2x+1\right)+\ln\left(2-x\right)=-1$ Note that you'll need the quadratic formula on this one and don't get too excited about the "messy" numbers here.

**Rates of Change and Tangent Lines**

**8.** An object is moving and we want to determine if it's moving to the right (positive velocity), left (negative velocity), or not moving (zero velocity) at $t=2$. The position of the object is given by

$$s\left(t\right)=\mathbf{e}^{t^2-4}-t^2$$

To answer this problem you'll need to estimate the instantaneous velocity at $t=2$. Do this by computing the average velocity (*i.e.* the average rate of change of the position function) between $t=2$ and the following values of *t*. Use at least 7 decimal places for all computations.

**(a)** 1.9 **(b)** 1.99 **(c)** 1.999 **(d)** 1.9999 **(e)** 2.1 **(f)** 2.01 **(g)** 2.001 **(h)** 2.0001

**9.** Find the tangent line to $f\left(x\right)=\dfrac{\sqrt{x^2+4}}{x+1}$ at $x=0$. To estimate the slope of the tangent line compute the slopes of the secant lines, $m_{PQ}$, at the following points and use the results to estimate the slope. Use at least 7 decimal places for all computations.

**(a)** -0.1 **(b)** -0.01 **(c)**-0.001 **(d)** -0.0001 **(e)** 0.1 **(f)** 0.01 **(g)** 0.001 **(h)** 0.0001

**Continued on Back** $\Rightarrow$

**The Limit**

**10.** Explain in your own words what is meant by

$$\lim_{x\to 7} f(x) = -25$$

Is it possible to also have $f(7) = 100$ ? Why or why not?

For problems 11 & 12 use at least 7 decimal places in the function evaluations.

**11.** Evaluate $f(x) = \dfrac{x^2 - 4x - 21}{x + 3}$ at the given points and estimate the value of $\lim\limits_{x\to -3} \dfrac{x^2 - 4x - 21}{x + 3}$ .

**(a)** -2.9 **(b)** -2.99 **(c)** -2.999 **(d)** -2.9999 **(e)** -3.1 **(f)** -3.01 **(g)** -3.001 **(h)** -3.0001

**12.** Evaluate $g(t) = \dfrac{t^4 - \cos(t-1)}{t^2 - 1}$ at the given points and estimate the value of $\lim\limits_{t\to 1} \dfrac{t^4 - \cos(t-1)}{t^2 - 1}$ .

**(a)** 0.9 **(b)** 0.99 **(c)** 0.999 **(d)** 0.9999 **(e)** 1.1 **(f)** 1.01 **(g)** 1.001 **(h)** 1.0001