MATH 21123 Quiz 1 1/21/11

Name: Key Lab Section: _____

1. Give the n^{th} term of the sequence $\{0, -1, 0, 1, 0, -1, 0, 1, ...\}$. (2) points

$$a_n = \cos\left(\frac{n\pi}{2}\right)$$

2. Determine whether the sequence $\{\cos(\frac{n\pi}{2})\}$ is increasing, decreasing or not monotonic. Is this sequence bounded? (3) points

The sequence $\left\{\cos\left(\frac{n\pi}{2}\right)\right\}$ is not monotone as it is oscillating.

Yes, it is bounded, $-1 \le \cos\frac{n\pi}{2} \le 1$.

3. Determine whether the sequence $a_n = \ln(2n^2 + 1) - \ln(n^2 + 1)$ converges or diverges. Give reason to support your answer. If it converges then find the limit. (3) points

$$a_n = \ln\left(\frac{2n^2+1}{n^2+1}\right)$$

$$\lim_{n\to\infty} a_n = \ln\left[\lim_{n\to\infty}\left(\frac{2n^2+1}{n^2+1}\right)\right] = \ln 2 \quad \text{Ans}$$

4. In Newton's method, if the n^{th} approximation is x_n and $f'(x_n) \neq 0$ then what is the next approximation, that is, give the formula for $x_{n+1} = ?$ (2) points

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)} \quad \text{Ans}$$