Answer Key

**Math 180**
**Worksheet 2**
**Section 2.3**

1.) How is $\lim_{x \to a} f(x)$ calculated if $f$ is a polynomial function?

$\lim_{x \to a} f(x) = f(a)$ if $f$ is a poly. func.

2.) Evaluate the following limits:

a. $\lim_{x \to -4} 4$

$= \boxed{4}$

b. $\lim_{x \to 0.5} (5x^3 + 2x - 1)$

$= 5\left(\frac{1}{2}\right)^3 + 2\left(\frac{1}{2}\right) - 1$

$= 5\frac{1}{8} + 1 - 1 = \boxed{\frac{5}{8}}$

c. $\lim_{x \to 3} \frac{x+2}{x-5}$

$= \frac{3+2}{3-5} = \boxed{\frac{5}{-2}}$

3.) Evaluate the following limits:

a. $\lim_{x \to 3} \frac{x^2-9}{x-3} = \lim_{x \to 3} \frac{(x-3)(x+3)}{x-3} = \lim_{x \to 3} \frac{x+3}{1} = \frac{3+3}{1} = \boxed{6}$

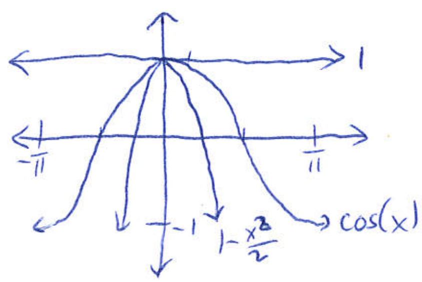
b. $\lim_{h\to 0} \frac{\sqrt{16+h}-4}{h}$ $= \lim_{h\to 0} \frac{\sqrt{16+h}-4}{h} \cdot \frac{(\sqrt{16+h}+4)}{(\sqrt{16+h}+4)} = \lim_{h\to 0} \frac{(\sqrt{16+h})^2 + \cancel{4\sqrt{16+h}} - \cancel{4\sqrt{16+h}} - 16}{h(\sqrt{16+h}+4)}$

$= \lim_{h\to 0} \frac{16+h-16}{h(\sqrt{16+h}+4)} = \lim_{h\to 0} \frac{h}{h(\sqrt{16+h}+4)} = \lim_{h\to 0} \frac{1}{\sqrt{16+h}+4}$

$= \frac{1}{\sqrt{16+0}+4} = \frac{1}{4+4} = \boxed{\frac{1}{8}}$

4.) It can be shown that $1 - \frac{x^2}{2} \le \cos x \le 1$, for $x$ near 0.

a. Illustrate these inequalities with a graph.




b. Use these inequalities to evaluate $\lim_{x\to 0} \cos x$.

$\lim_{x\to 0} 1 - \frac{x^2}{2} = 1 - \frac{0^2}{2} = 1 - 0 = 1$

$\lim_{x\to 0} 1 = 1$

~~So by squeeze th~~

So by squeeze thm, $\lim_{x\to 0} \cos(x) = 0$