Calculus 1 Review Problems for Test 1

1) State the definition of (a) function, (b) limit (ε – δ definition), and compute the largest value of δ that satisfies the ε – δ condition for the following statement:

$$\lim_{x\to 2} (5x + 1) = 11 \text{ for } \varepsilon = .25$$

2) Without any calculator, sketch the graphs on the same set of axes:

a) $f(x) = \sqrt{x}$ b) $f(x) = \sqrt{x} - 2$ c) $f(x) = -\sqrt{x+3}$

3) Without a calculator, sketch the graphs of:

a) $f(x) = \tan x$ b) $f(x) = 3 \sin x + 2$

4) Compute each of these values without the aid of a calculator:

a) convert 24 degrees to radians b) convert $\frac{7\pi}{6}$ radians to degrees

c) $\sin \frac{-2\pi}{3}$ d) $\tan 12\pi$ e) $sec \frac{3\pi}{4}$

5) Solve for x $(0 \le x < 2\pi)$: a) $\sin(x) = \frac{-\sqrt{3}}{2}$ b) $\cos^2 x - \frac{1}{2}\cos x = 0$

6) Prove $\lim_{x\to 2} (1 - 4x) = -7$ by using the ε – δ definition of a limit.

7) Compute the limits. Show relevant work!

a) $\lim_{x\to 2} (5x^2 - 3x + 2)$ g) $\lim_{x\to 4^+} \sqrt{12-3x}$

b) $\lim_{x\to 5} \frac{x^2+x-30}{10-2x}$ h) $\lim_{x\to 4^-} \sqrt{12-3x}$

c) $\lim_{x\to 4} \sqrt{12-3x}$ i) $\lim_{x\to 3^+} \frac{5x+2}{2x-6}$

d) $\lim_{x\to 7^-} \sqrt{-x+7}$ j) $\lim_{x\to 3^-} \frac{5x+2}{2x-6}$

e) $\lim_{x\to 10} (55)$ k) $\lim_{x\to 0} \left(\frac{\sin 6x}{3x}\right)$

f) $\lim_{x\to 9} \frac{x-9}{\sqrt{x}-3}$ l) $\lim_{x\to 0} \left(\frac{3x+1+\sin x - \cos x}{x}\right)$

8) Evaluate f(x) and find the left, right, two-sided limits at x = 0, 1, 2, and 3.

$$f(x) = \begin{cases} x^2 & if\ \ 0 < x < 1 \\ x & if\ \ 1 \le x < 3 \\ 2x & if\ \ x > 3 \end{cases}$$

9) If $f(x) = \sqrt{x+3}$ and $g(x) = x^2 - 1$, find

a) $g(\sqrt{13})$ b) $f(g(x))$ c) $g(f(6))$ d) $g(x+h)$

e) the domain of f(x) f) the domain of $\frac{3}{g(x)}$