5A PREREQUISITE SKILLS Review.

Algebra - A

(1) Use the definition of absolute value to rewrite the following expressions without using the absolute value symbol.

(a) $|x-2| = \begin{cases} x-2, & \text{if } x \geq 2 \\ -(x-2), & \text{if } x < 2 \end{cases}$ (b) $x-|x| = \begin{cases} 0, & \text{if } x \geq 0 \\ 2x, & \text{if } x < 0 \end{cases}$

(2) Solve the inequalities:

(a) $|x-3| \leq 1$ $[2,4]$ (b) $x^2 < 2x+8$ $(-2,4)$ (c) $\frac{x+1}{x-5} > 0$ $(-\infty,-1) \cup (5,\infty)$

(3 Factor:

(a) $x^3(a+2b) - 27(a+2b)$ $(a+2b)(x-3)(x^2+3x+9)$ (b) $3x^{1/2} - 9x$ $3x^{1/2}(1-3x^{1/2})$ (c) $6x^2(2x+1)^{-1/3} + 2x(2x+1)^{2/3}$ $(2x+1)^{-1/3}(2x)(5x+1)$ (d) x^3+4x^2+x+4 $(x+4)(x^2+1)$

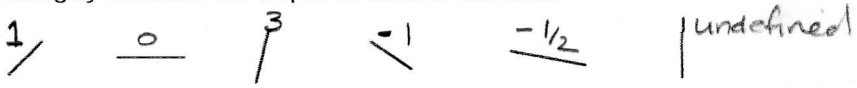
(4) Simplify

(a) $\dfrac{\frac{-1}{\sqrt{1-x^2}} + \sqrt{1-x^2}}{x^2}$ $\dfrac{-1}{\sqrt{1-x^2}}$ (b) $\dfrac{3(1+x)^{1/3} - x(1+x)^{-2/3}}{(1+x)^{2/3}}$ $\dfrac{3+2x}{(1+x)^{4/3}}$ (c) $\dfrac{(x+h)^{-3} - x^{-3}}{h}$ $\dfrac{-3x^2-3xh-h^2}{x^3(x+h)^3}$

Analytic Geometry - B

(5) (a) Find the equation of the line which passes through the points (2,1) and (-5,2). $y-1 = -\frac{1}{7}(x-2)$

(b) Roughly estimate the slopes of each of the lines:



Functions - C

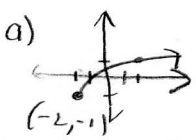
(6) (a) Given $g(x) = \frac{1}{x}$ find and simplify: $\dfrac{g(x)-g(a)}{x-a}$ $-\frac{1}{ax}$

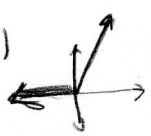
(b) Given $f(x) = x^2-3x$ find and simplify: $\dfrac{f(x+h)-f(x)}{h}$ $2x+h-3$

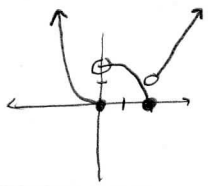
(7) Sketch the graph of f. You should not "just plot points".

(a) $f(x) = \sqrt{x+2} - 1$ (b) $f(x) = |x| + x$ (c) $f(x) =$

$$\begin{cases} x^2 \text{ if } x \leq 0 \\ \sqrt{4-x^2} \text{ if } 0 < x \leq 2 \\ 2x-3 \text{ if } x > 2 \end{cases}$$

a) 

b) 

c) 

Trigonometry - D

(8) Find the following trigonometric values exactly (no calculator)

(a) $\sin(7\pi/6)$ $-1/2$ (b) $\tan^{-1}(-1)$ $-\pi/4$ (c) $\cos(\pi)$ -1 (d) $\sin(-\pi/3)$ $-\sqrt{3}/2$

(e) $\cot(7\pi/4)$ -1 (f) $\tan(3\pi/2)$ undef. (g) $\cos^{-1}(-1/2)$ $2\pi/3$ (h) $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ $-\frac{\pi}{4}$

(9) Graph $f(x) = -2\cos(2x)$

(10) Find all solutions in $[0,2\pi)$: $2\cos^2 x = 1 + \sin x$ $x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$

(11) Solve: $\sin 2x - \cos x = 0$. $x = \frac{\pi}{2} + \pi k, \frac{\pi}{6} + 2\pi k, \frac{5\pi}{6} + 2\pi k$

(9)