HL Math Review Topic 2: Functions

1. The function f is defined as $f(x) = -3 + \dfrac{1}{x-2}, x \neq 2$.

a. i. Sketch the graph of f, clearly indicating any asymptotes and axes intercepts.

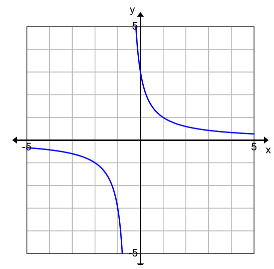
ii. Write down the equations of any asymptotes and the coordinates of any axes intercepts.

b. Find the inverse function f^{-1}, stating its domain.

3. Describe a sequence of transformations that will transform $f(x) = x^2 - 3$ into $g(x) = (4x-12)^2 + 7$.

3. If $h(x) = 12 + \sqrt{3+2x}$, then what is $h^{-1}(17)$?

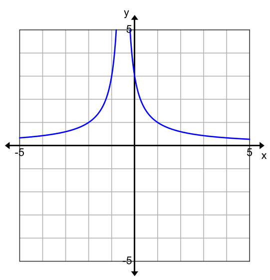
4. Solve $\dfrac{3x+2}{x-4} \geq \dfrac{3x}{x+1}$ for x with a. No Calculator b. Your GFC



5. Matching: Given the graph of $f(x)$ to the right, which of the following shows

i. $y = |f(x)|$ ii. $y = f(|x|)$ iii. $y = f(-x)$ iv. $y = -f(x)$

A.



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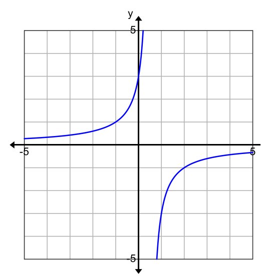
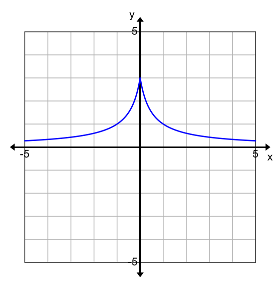
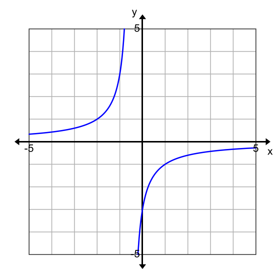


C.



D.



Quadratics

6. Given the equation $4x^2 + (k+1)x + 1 = 0$, find all k values for which the equation has

a. one real solution b. no real solutions

7. Find the values of m for which the lines $y = mx + 5$ are tangents to the curve with equation $y = 8x^2 + 2x + 7$

Polynomials

<u>The Remainder Theorem</u>: When $P(x)$ is divided by $x - a$, the remainder is ________.

<u>The Factor Theorem</u>: k is a zero of $P(x)$ if and only if ________ is a factor of $P(x)$.

<u>The Fundamental Theorem of Algebra</u>: Every polynomial of degree n has exactly ___ roots (including _______________).

Given a polynomial $a_n x^n + a_{n-1}x^{n-1} + \ldots + a_2 x^2 + a_1 x + a_0 = 0$, the roots have **sum** _________ and **product** _________.

8. Consider $p(x) = 3x^3 + ax + 5a$. The polynomial $p(x)$ leaves a remainder of -7 when divided by $(x-a)$. Show that only one value of a satisfies the above condition and state its value.

9. Fully factor $g(x) = 2x^3 + ax^2 - x - 6$ if $x - 1$ is a factor.

10. A real polynomial has the form $P(x) = 3x^4 - 12x^3 + cx^2 + dx + e$. The graph of $y = P(x)$ has y-intercept (0, 180). It cuts the x-axis at 2 and 6, and does not meet the x-axis anywhere else. Suppose the other two zeros are $m \pm ni,\ n > 0$

Use the sum and product formulae to find m and n.

HL Math Review Topic 3: Trigonometry

1 – 3: Multiple Choice

1. Simplify: $\dfrac{\cos\left(\frac{3\pi}{4}\right)}{\cot\left(\frac{5\pi}{6}\right)} + \sec^2\left(\frac{11\pi}{6}\right)\sin\left(\frac{5\pi}{4}\right)$

a. $\dfrac{4\sqrt{2}-\sqrt{6}}{6}$ b. $\dfrac{\sqrt{2}-4\sqrt{6}}{6}$ c. $\dfrac{\sqrt{6}-4\sqrt{2}}{6}$

d. $\dfrac{\sqrt{6}+4\sqrt{2}}{6}$ e. $\dfrac{4\sqrt{6}-\sqrt{2}}{6}$

2 and 3: Given $\cos\theta = -\frac{3}{4}$ and θ is in QII, find the following:

2. $\tan\theta$

a. $\frac{5}{3}$ b. $-\frac{\sqrt{7}}{3}$ c. $\frac{3\sqrt{7}}{49}$

d. $-\frac{3\sqrt{7}}{7}$ e. $\frac{\sqrt{7}}{3}$

3. $\csc\theta$

a. $-\frac{4}{3}$ b. $-\frac{3\sqrt{7}}{7}$ c. $\frac{4}{5}$

d. $\frac{4\sqrt{7}}{7}$ e. $\frac{\sqrt{7}}{4}$

4. Solve for all possible triangles: a. $A = 21^\circ$, $a = 9$ m, $b = 13$ m b. $a = 19$ ft, $B = 47^\circ$, $c = 24$ ft

5. Write the equation for a sine function with a maximum at $(-8,15)$ and a minimum at $(4,-9)$.

6. Given that $\sin u = \frac{2}{3}$, $\cos v = -\frac{1}{5}$, and u and v are in Quadrant IV, find: a. $\tan\left(\frac{v}{2}\right)$ b. $\cos(u-v)$

7. Prove the identity: $\dfrac{\sin x}{1+\cos x} = \csc x - \cot x$

Function	Domain	Range
arcsin x		
arccos x		
arctan x		

8. Find the exact value:

a. $\sin^{-1}\left(\tan\frac{3\pi}{4}\right)$ b. $\cos\left(\tan^{-1}\left(\frac{7}{3}\right)\right)$