# Spring 2012 Math 151

**Week in Review # 1**
sections: Review, Appendix D, 1.1
*courtesy: Joe Kahlig*

## Review and Appendix D

1. Find the domain of these functions.

   (a) $f(x) = \dfrac{x+1}{x^{7/3} - 3x^{4/3} - 10x^{1/3}}$

   (b) $g(x) = \dfrac{\sqrt{x^2 - 4}}{\sqrt{x+5}}$

2. If $\tan(\theta) = \dfrac{9}{12}$ and $\theta$ is in Quadrant III, find the exact values of

   $\sin(\theta) = $ _____          $\cos(\theta) = $ _____          $\sec(\theta) = $ _____

   $\csc(\theta) = $ _____          $\cot(\theta) = $ _____

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**Trig. Identities**

$\sin(2x) = 2\sin(x)\cos(x)$                     $\sin(x+y) = \sin(x)\cos(y) + \cos(x)\sin(y)$

$\cos(2x) = 2\cos^2(x) - 1$                     $\sin(x-y) = \sin(x)\cos(y) - \cos(x)\sin(y)$

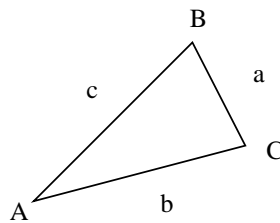$\cos(x+y) = \cos(x)\cos(y) - \sin(x)\sin(y)$                     $\cos(x-y) = \cos(x)\cos(y) + \sin(x)\sin(y)$

**Law of Sines**

$\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$

**Law of Cosines**
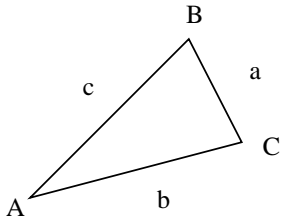
$a^2 = b^2 + c^2 - 2bc\cos A$



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3. If $\sin(x) = \frac{1}{6}$ and $\sec(y) = \dfrac{17}{15}$, where x and y lie between 0 and $\dfrac{\pi}{2}$, evaluate the expression using trigonometric identities.

   (a) $\sin(2x) = $ _____

   (b) $\cos(x+y) = $ _____

   (c) $\sin(x-y) = $ _____

4. The triangle below has the following values: $c = 4$, $a = 5$ and $B = 25^o$. Find $b$.



5. Solve for $x$ where $0 \le x \le 2\pi$.

   (a) $2\cos^2(x) - \cos(x) - 1 = 0$

   (b) $\sin(x)\cos(x) = \dfrac{1}{4}$

## Section 1.1

6. Given $A(1,6)$ and $B(5,-3)$, find the vector $\overrightarrow{BA}$.

7. Given $\mathbf{a} = 2\mathbf{i} + 5\mathbf{j}$ and $\mathbf{b} = \langle 4, 1 \rangle$. Find the following.

   (a) $|\mathbf{a}|$

   (b) $3\mathbf{b} - 2\mathbf{a}$

   (c) Find scalars $s$ and $t$ so that $s\mathbf{a} + t\mathbf{b} = \mathbf{c}$ where $\mathbf{c} = \langle 24, -3 \rangle$

   (d) Find the unit vector that is in the same direction of $\mathbf{b}$.

   (e) Find a vector of length 3 in the opposite direction of $\mathbf{b}$.

8. Two forces T and S with magnitudes 4 pounds and 2 pounds act on an object at a point P as shown in the picture. Find the resultant force as well as it's magnitude and direction. (Indicate the direction by finding the angle between the vector and the positive x-axis.)
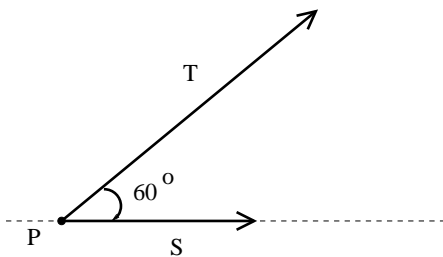


9. Two tug boats are towing a large ship into port. The larger tug exerts a force of 4500 pounds on its cable, and the smaller tug exerts a force of 2700 pounds on its cable. If the ship is to travel in a straight line, find the angle $\theta$ that the larger tug must make if the smaller tug makes an angle of $30^o$.
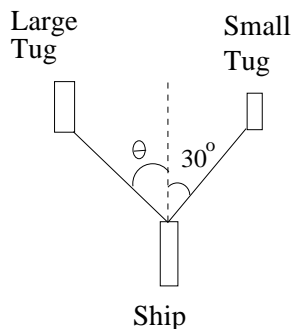
10. A pilot wishes to set a course so that his ground speed is northeast(N45$^o$E) at 180 mph. The wind is blowing in the direction of S30$^o$E at 40 mph. What course (speed and bearing) should the pilot set in order to achieve his desired ground speed?