MATH 1330 - Review for Final Exam

When: Monday, May 9 – Thursday, May 12.

Where: CASA – Schedule the final exam!!! Begins on Friday!

What is covered: All chapters.

What to bring: **Picture ID**, pencil and eraser.

Number of questions: 31 multiple choice questions (100 points).

Time: 110 minutes

Take practice Final: 10% of your grade will be added to your final score.

Do the teacher evaluation before Thursday, May 5, midnight.
(5 bonus points will be added to your final score!)

Handy Formulas

$\sin(s+t) = \sin s \cos t + \cos s \sin t$

$\sin(s-t) = \sin s \cos t - \cos s \sin t$

$\cos(s+t) = \cos s \cos t - \sin s \sin t$

$\cos(s-t) = \cos s \cos t + \sin s \sin t$

$\tan(s+t) = \dfrac{\tan s + \tan t}{1 - \tan s \tan t}$

$\tan(s-t) = \dfrac{\tan s - \tan t}{1 + \tan s \tan t}$

$\sin(2t) = 2\sin t \cos t$

$\cos(2t) = \cos^2 t - \sin^2 t$

$\sin\dfrac{s}{2} = \pm\sqrt{\dfrac{1-\cos s}{2}}$

$\cos\dfrac{s}{2} = \pm\sqrt{\dfrac{1+\cos s}{2}}$

$\tan\dfrac{s}{2} = \dfrac{\sin s}{1+\cos s}$

Given Formulas:

$$\sin(A+B) = \sin A\cos B + \cos A\sin B$$

$$\cos(A+B) = \cos A\cos B - \sin A\sin B$$

$$\sin(A-B) = \sin A\cos B - \cos A\sin B$$

$$\cos(A-B) = \cos A\cos B + \sin A\sin B$$

$$\tan\left(A+B\right) = \frac{\tan A+\tan B}{1-\tan A\tan B}$$

$$\tan\left(A-B\right) = \frac{\tan A-\tan B}{1+\tan A\tan B}$$

$$\sin(2\theta) = 2\sin\theta\cos\theta$$

$$\cos(2\theta) = \cos^2\theta-\sin^2\theta$$

$$\tan(2\theta) = \frac{2\tan\theta}{1-\tan^2\theta}$$

$$\sin\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1-\cos\theta}{2}}$$

$$\cos\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1+\cos\theta}{2}}$$

$$\tan\left(\frac{\theta}{2}\right) = \frac{\sin\theta}{1+\cos\theta}$$

1. What is the y intercept(s) for $f(x) = -2(x-2)^2(x+1)$?

A. (0, 8)

B. (0, 0)

C. (0, −8)

D. (2, 0) and (−1, 0)

E. None of the above

$\begin{cases} \text{y-intercept} \\ x=0 \end{cases} \Rightarrow y = f(0)$

$= -2(0-2)^2(0+1)$

$= -2 \cdot 4 \cdot 1 = -8$

$\Rightarrow \boxed{(0,-8)}$

Vertical Asymptotes / Holes

2. Find the vertical asymptote(s) and/or hole(s), if any, for $f(x) = \dfrac{x^2+3x-18}{x^2+7x+6}$. $\Rightarrow$ factor

$= \dfrac{\cancel{(x+6)}(x-3)}{\underbrace{\cancel{(x+6)}}_{\text{hole}}\underbrace{(x+1)}_{\text{V.A.}}}$

A. There are no vertical asymptotes or holes.

B. Vertical asymptotes at x = −6 and x = −1; no holes

C. Vertical asymptote at x = −6 and hole at x = −1

D. Vertical asymptote at x = −1 and hole at x = −6

E. Holes at x = −6 and x = −1; no vertical asymptotes

$x+6=0 \quad x+1=0$

$x=-6$ hole $\quad x=-1$ V.A.

3. Suppose that $f(x) = \dfrac{2x+3}{x-1}$. Find $f^{-1}(x)$.

A. $f^{-1}(x) = \dfrac{x-1}{2x+3}$

B. $f^{-1}(x) = \dfrac{x-3}{2x-3}$

C. $f^{-1}(x) = \dfrac{2x+1}{x+3}$

D. $f^{-1}(x) = \dfrac{x+3}{x-2}$

E. None of the above

1. Rewrite $y = \dfrac{2x+3}{x-1}$

2. Exchange $\dfrac{x}{1} = \dfrac{2y+3}{y-1}$

3. Solve for y : Cross-Product

$x(y-1) = 2y+3$

$xy - 2y = x+3$

$\dfrac{y\cancel{(x-2)}}{\cancel{x-2}} = \dfrac{x+3}{x-2}$

$\Rightarrow \boxed{f^{-1}(x) = \dfrac{x+3}{x-2}}$

4. Determine the end behavior of the polynomial function $f(x) = -3x^2(x+1)(x-2)^3$.

A. Both ends up $\nwarrow \nearrow$

B. Both ends down $\swarrow \searrow$

C. Rising left to right $\swarrow \nearrow$

D. Falling left to right $\nwarrow \searrow$

Find the leading term:

- $-3 \cdot x^2 \cdot x^1 \cdot x^3 = -3x^6$

even-degree, negative $\swarrow \searrow$

Polynomial Equation

5. Which of the following functions gives this graph?

A. $f(x) = x(x-1)^3(x+2)$

B. $f(x) = -x^3(x+1)(x-2)$

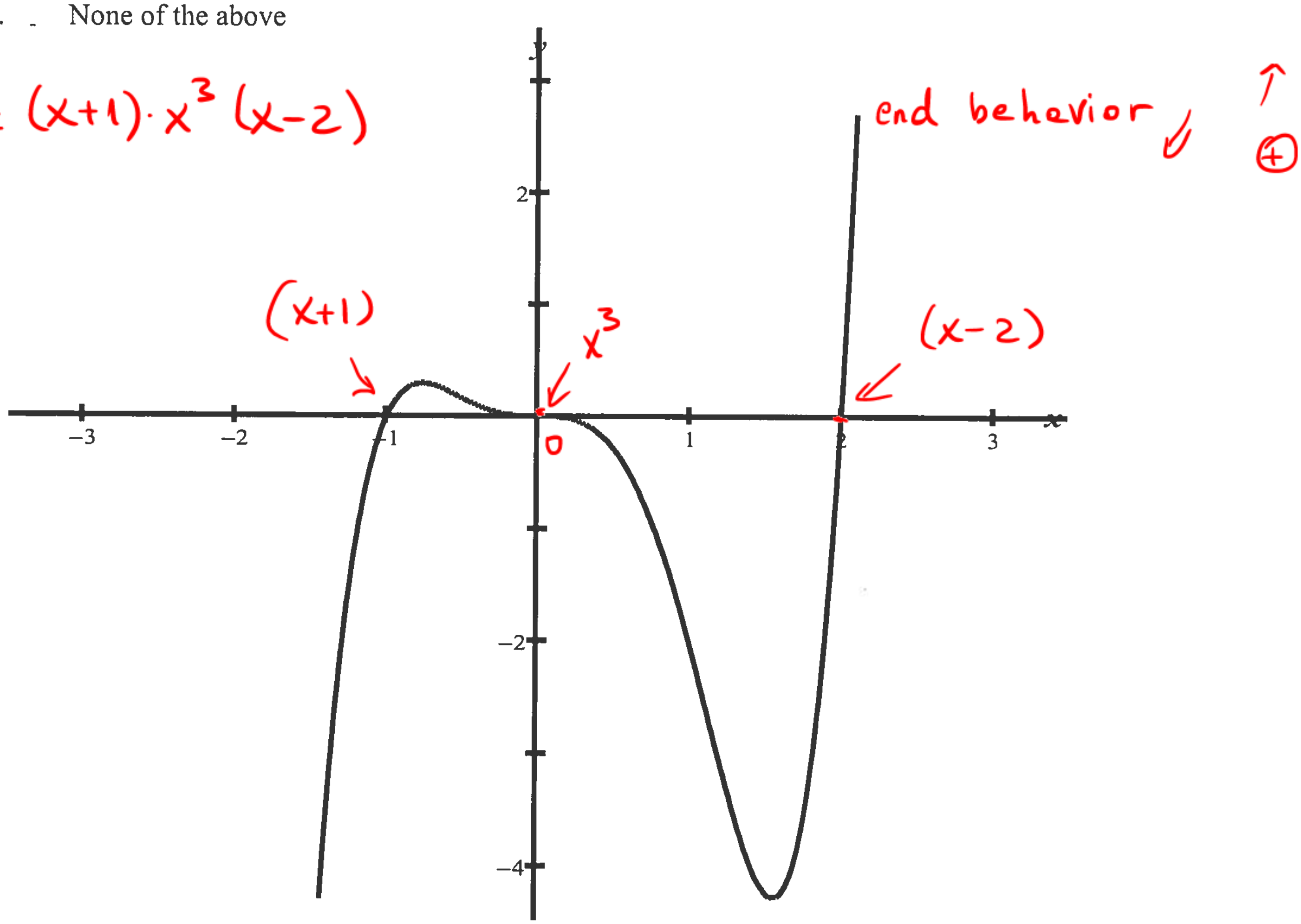
C. $f(x) = x^3(x+1)(x-2)$

D. $f(x) = x^3(x-1)(x+2)$

E. None of the above

- Find zeros and their multiplicities
- Find coefficient from end behaviour

$f(x) = (x+1) \cdot x^3 (x-2)$



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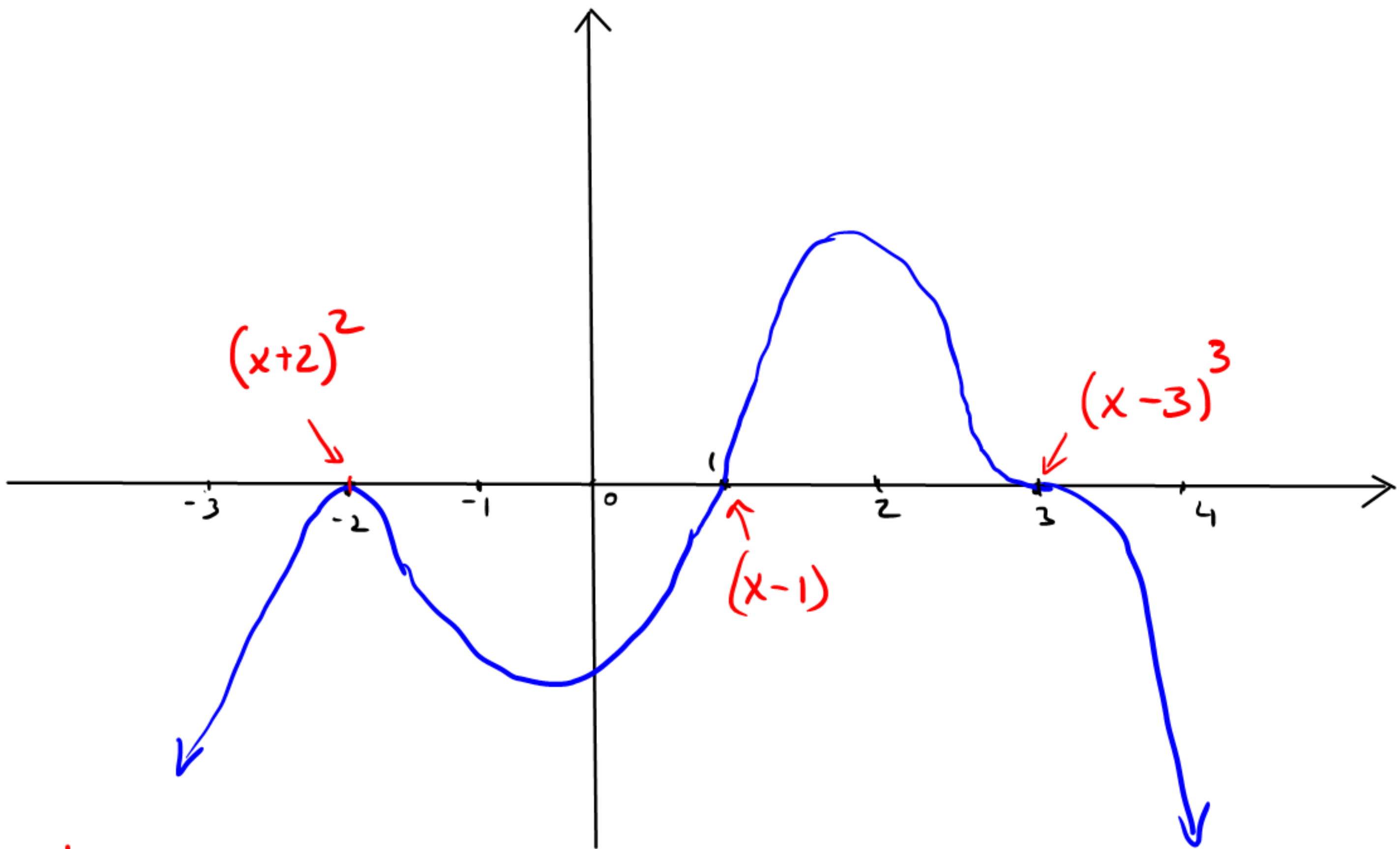


end behaviour :

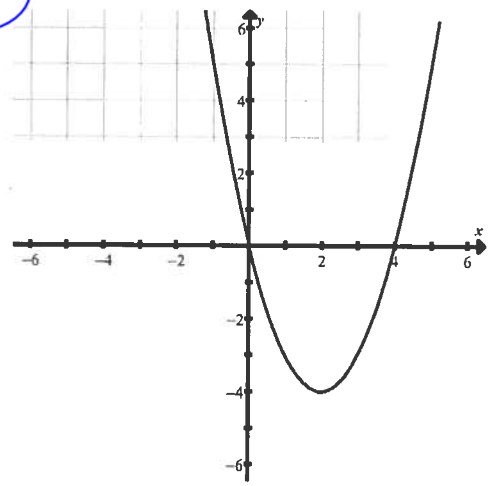
$\ominus$ $\quad \swarrow \cdots \searrow$

$$f(x) = -2(x+2)^2(x-1)(x-3)^3$$

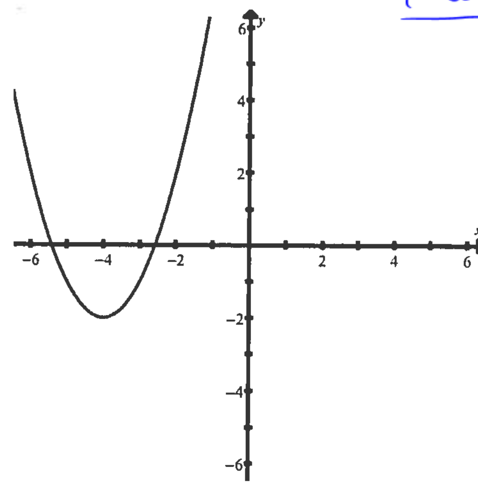
6. Which of the following is the graph of $f(x) = (x-2)^2 - 4$ $\longrightarrow$ shift x^2 2 to right

4 down

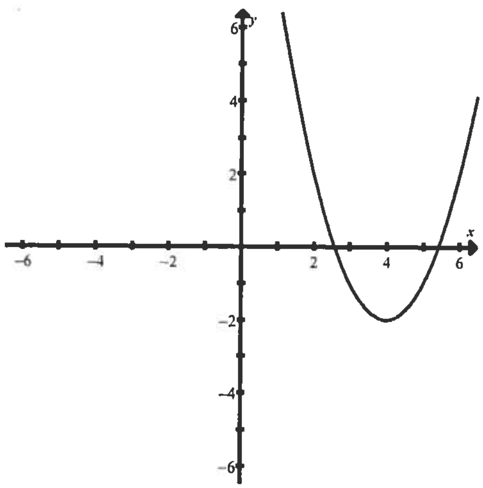
A.



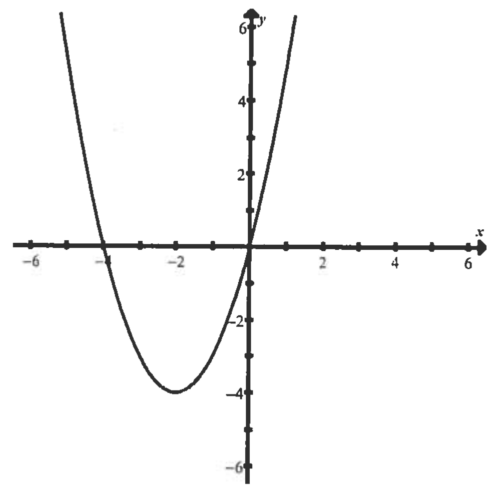
B.



C.



D.



Circle Equation

7. Write the equation of the circle with center (–1, 2) and radius 9.

A. $(x-1)^2 + (y+2)^2 = 9$

B. $(x+1)^2 + (y-2)^2 = 9$

C. $(x+1)^2 + (y-2)^2 = 81$

D. $(x-1)^2 + (y+2)^2 = 81$

$(x-h)^2 + (y-k)^2 = r^2$

$\downarrow$ substitute

$(x-(-1))^2 + (y-2)^2 = 9^2$

$\boxed{(x+1)^2 + (y-2)^2 = 81}$

Ellipse Vertices

8. What are the vertices for $\frac{x^2}{9}+\frac{y^2}{64}=1$?

A. (0, 8) and (0, –8)
B. (8, 0) and (–8, 0)
C. (0, –3) and (0, 3)
D. (–3, 0) and (3, 0)
E. None of the above

- Compare the coefficients
- The bigger one determines whether horizontal / vertical

$\rightarrow$ Vertical ellipse

$b^2 = 64 \Rightarrow b = \pm 8$

$\Rightarrow$ $\boxed{\text{Vertices } (0,8), (0,-8)}$

Intersection Points

9. Find the x-coordinates of the points of intersection for the functions shown below:

$$f(x) = x^2 + 2x - 1$$
$$g(x) = 3x + 5$$

A. $\left\{2, \frac{3}{2}\right\}$
B. $\{-5, 0\}$
C. $\{-3, 2\}$
D. $\{-4, 6\}$
E. $\{-2, 3\}$

In such questions, make

$f(x) = g(x)$ and solve:

$x^2 + 2x - 1 = 3x + 5$

$x^2 - x - 6 = 0$

$(x-3)(x+2) = 0 \Rightarrow \boxed{x = 3, -2}$

Vertex of Parabola

10. State the coordinates of the vertex for the given parabola.

$$x^2 - 8x + 31 + 3y = 0$$

A. (2, –5)
B. (4, –5)
C. (5, –4)
D. (–5, 4)
E. (–4, 5)

$x^2 - 8x + 4^2 = -3y - 31 + 4^2$

$\frac{8}{2} = 4$

$\Rightarrow (x-4)^2 = -3y - 15$

$\boxed{(x-4)^2 = -3(y+5) \Rightarrow V = (4, -5)}$

11. Simplify the following expression:

$$\frac{cos(\theta)}{1-sin(\theta)}-\frac{cos(\theta)}{1+sin(\theta)}$$ ← Common Denominator

A. $-csc(\theta)$

B. $-cos(\theta)$

C. $2\,tan(\theta)$

D. $2\,sec(\theta)$

E. $-cot^2(\theta)$

$$=\frac{\cos\theta(1+\sin\theta)}{(1-\sin\theta)(1+\sin\theta)}-\frac{\cos\theta\cdot(1-\sin\theta)}{(1+\sin\theta)\cdot(1-\sin\theta)}$$

$$=\frac{\cancel{\cos\theta}+\cos\theta\sin\theta-\cancel{\cos\theta}+\cos\theta\sin\theta}{\underbrace{1-\sin^2\theta}=\cos^2\theta}$$

$$=\frac{2\,\cancel{\cos\theta}\cdot\sin\theta}{\cos^{\cancel{2}}\theta}=\frac{2\sin\theta}{\cos\theta}=\boxed{2\tan\theta}$$

12. Which of the following equals $1-(sin\,x+cos\,x)^2$?

A. 0

B. $-sin(2x)$

C. $2\,cos^2(x)$

D. $-cos(2x)$

E. None of the above.

FOIL

$$=1-(\sin x+\cos x)(\sin x+\cos x)$$

$$=1-[\sin^2 x+\underline{\sin x\cos x}+\underline{\cos x\sin x}+\cos^2 x]$$

$$=1-[1+2\sin x\cos x]$$

$$=\cancel{1}-\cancel{1}-\underbrace{2\sin x\cos x}=\boxed{-\sin(2x)}$$

Unit Circle

13. Evaluate: $cos\left(\frac{2\pi}{3}\right)$

$$\overset{\text{II}}{=}-\cos\left(\underset{\text{reference}}{\frac{\pi}{3}}\right)=-\frac{1}{2}$$

A. $-\frac{\sqrt{3}}{3}$ B. $-\frac{1}{2}$ C. $\frac{1}{2}$ D. $\frac{\sqrt{3}}{2}$ E. $-\frac{\sqrt{3}}{2}$

Unit Circle

III

14. Evaluate: $\sin\left(-\frac{5\pi}{6}\right) = -\sin\left(\underset{\text{reference}}{\underline{\underline{\frac{\pi}{6}}}}\right) = -\frac{1}{2}$

A. $-\frac{\sqrt{3}}{2}$ B. $\frac{\sqrt{3}}{2}$ C. $\frac{\sqrt{3}}{3}$ D. $\frac{1}{2}$ E. $-\frac{1}{2}$

15. Find the exact value of $\sqrt{1+\cot^2\left(\frac{2\pi}{3}\right)}$.

A. $\sqrt{2}$

B. $\frac{4}{3}$

C. 2

D. $\frac{2\sqrt{3}}{3}$

$$\cot\left(\frac{2\pi}{3}\right) = \frac{\cos\left(\frac{2\pi}{3}\right)}{\sin\left(\frac{2\pi}{3}\right)} = \frac{-\frac{1}{\cancel{2}}}{\frac{\sqrt{3}}{\cancel{2}}} = -\frac{1}{\sqrt{3}}$$

$$\sqrt{1+\cot^2\left(\frac{2\pi}{3}\right)} = \sqrt{1+\left(-\frac{1}{\sqrt{3}}\right)^2} = \sqrt{1\cdot\frac{3}{3}+\frac{1}{3}} = \sqrt{\frac{4}{3}} = \frac{2}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{2\sqrt{3}}{3}}$$

Inverse Sine / Cosine

II

16. Evaluate: $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) = \theta \iff \cos\theta = -\frac{\sqrt{3}}{2} \Rightarrow \boxed{\theta = \frac{5\pi}{6}}$

A. $-\frac{\pi}{6}$ B. $\frac{2\pi}{3}$ C. $\frac{5\pi}{6}$ D. $-\frac{\pi}{3}$ E. undefined

17. Find the exact value of the following expression. If undefined, state, *undefined*.

$$\underbrace{sec\left(sin^{-1}\left(\frac{3}{5}\right)\right)}_{\theta} = \sec\theta$$

A. $\frac{5}{4}$

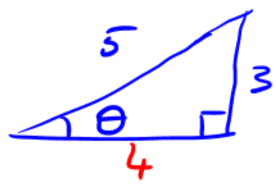
B. $\frac{3}{4}$

C. $\frac{4}{5}$

D. $\frac{4}{3}$

E. undefined

$\Rightarrow \sin^{-1}\left(\frac{3}{5}\right) = \theta \iff \sin\theta = \frac{3}{5}$



$\Rightarrow \boxed{\sec\theta = \frac{5}{4}}$

18. Suppose that $\underline{\pi < \theta < \frac{3\pi}{2}}_{\text{III}}$ and that $\tan\theta = \frac{1}{4}$. Compute $\sin\theta$. $\rightarrow$ negative

$1^2 + 4^2 = 17$

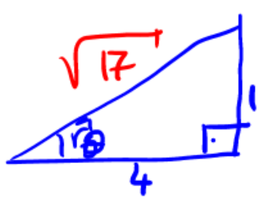
A. $\frac{\sqrt{17}}{17}$

B. $\frac{\sqrt{15}}{4}$

C. $-\frac{\sqrt{15}}{4}$

D. $-\frac{\sqrt{17}}{17}$

E. None of the above



$\Rightarrow \boxed{\sin\theta = -\frac{1}{\sqrt{17}} \cdot \frac{\sqrt{17}}{\sqrt{17}} = \frac{-\sqrt{17}}{17}}$

19. Determine the equation of the sine function which has amplitude 2 and period 4. No shiftments

A. $y = 2\,sin\left(\frac{\pi}{2}x\right)$

B. $y = 2\,sin(4x)$

C. $y = 4\,sin(2x)$

D. $y = 4\,sin\left(\frac{\pi}{4}x\right)$

$A = 2$, period $= 4$

period $= \frac{2\pi}{B} = \frac{4}{1}$

$4B = 2\pi$

$\Rightarrow B = \frac{\pi}{2}$

$$\boxed{f(x) = 2\sin\left(\frac{\pi}{2}x\right)}$$

Vertical Asymptotes for Secant/Cosecant

20. Which of these is an equation of one of the asymptotes of the following function?

$$f(x) = 7\sec\left(\frac{1}{5}x\right) + 6 = 7 \cdot \frac{1}{\underbrace{\cos\left(\frac{1}{5}x\right)}_{=0}} + 6$$

A. $x = \frac{5}{4}\pi$

B. $x = \frac{5}{8}\pi$

C. $x = 6$

D. $x = 5\pi$

E. $x = \frac{5}{2}\pi$

$$\cos\left(\frac{1}{5}x\right) = 0$$

$$\Longrightarrow \frac{1}{5}x = \frac{\pi}{2} \Longrightarrow \boxed{x = \frac{5\pi}{2}}$$

Phase Shift = C/B

21. Find the horizontal shift for the following function:

$$f(x) = 5\cos\left(\overset{B}{\frac{1}{4}\pi}x - \overset{C}{\pi}\right) - 2$$

A. 4 left

B. 4 right

C. π right

D. 2 left

E. π left

$$\text{Shift} = \frac{\cancel{\pi}}{\frac{1}{4}\cancel{\pi}} = \boxed{4 \text{ right}}$$

Amplitude Definition $= \frac{1}{2} \cdot$ distance from max. to min.

22. A sine graph with amplitude of 8 has a maximum value of 3. What is its minimum value?

$A = 8$ $\quad M = 3 \quad \Longrightarrow \quad m = ?$

A. –5 B. –11 C. –13 D. 19

Let max $= M$, min $= m$ $\Longrightarrow$ $\underbrace{M - m}_{\text{distance}} = 2 \cdot A$

$$3 - m = 2 \cdot 8$$

$$-m = 16 - 3 = 13 \Longrightarrow \boxed{m = -13}$$

23. In right triangle ABC with $m\angle C = 90°$, $m\angle B = 55°$ and AB measures 14 units. Find the length of AC.

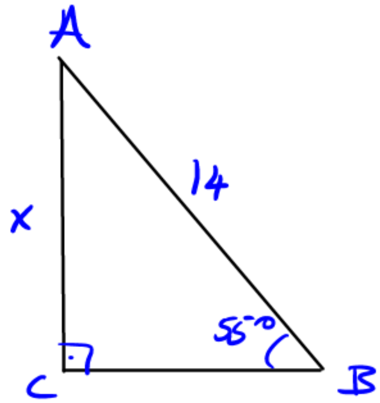
A. $14\tan(55°)$

B. $14\sin(55°)$

C. $14\cos(55°)$

D. $\sin(55°)$

E. 7



$\Rightarrow \dfrac{\sin(55°)}{1} = \dfrac{x}{14}$

$\boxed{x = 14 \cdot \sin(55°)}$

24. Find the area of an equilateral triangle with side length 6 feet.

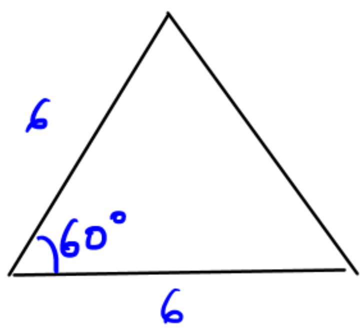
A. $12\sqrt{3}$ ft^2

B. $9\sqrt{3}$ ft^2

C. 6 ft^2

D. $18\sqrt{3}$ ft^2

E. $6\sqrt{3}$ ft^2



$\text{Area} = \frac{1}{2} \cdot 6 \cdot 6 \cdot \sin(60°)$

$= \frac{1}{\cancel{2}} \cdot \frac{\overset{9}{\cancel{36}}}{1} \cdot \frac{\sqrt{3}}{\cancel{2}}$

$= \boxed{9\sqrt{3}}$

Laws of Sines

25. In triangle MNO, the measure of angle M is 30°, the length of NO is 5, and the length of MO is $5\sqrt{2}$. Find all possible measures for angle N.

Check

- MO > NO
  $5\sqrt{2} > 5$
- draw h

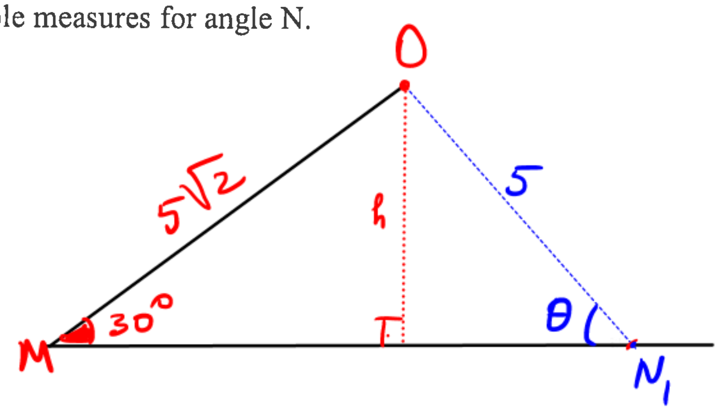
A. 60°

B. 30° or 60°

C. 135°

D. 45°

E. 45° or 135°



$h = 5\sqrt{2} \cdot \sin(30°)$

$= \frac{5\sqrt{2}}{2} < NO$

$\Rightarrow$ two triangles

$\dfrac{\sin(30)}{5} = \dfrac{\sin(N)}{5\sqrt{2}}$

$\Rightarrow \sin(N) = \frac{\sqrt{2}}{2} \Rightarrow \boxed{N = 45° \text{ or } 135°}$

25. In triangle MNO, the measure of angle M is 30°, the length of NO is 5, and the length of MO is $5\sqrt{2}$. Find all possible measures for angle N.

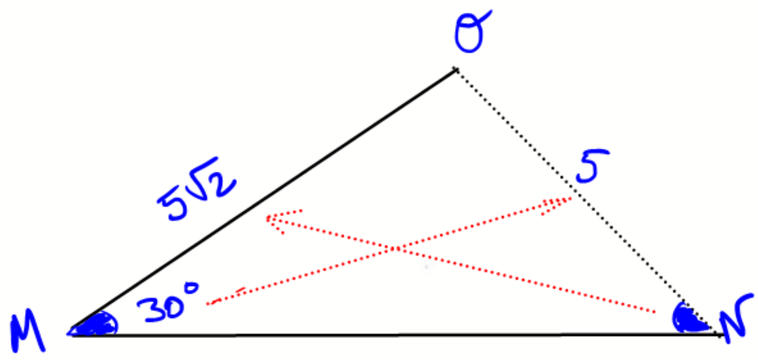
A. 60°

B. 30° or 60°

C. 135°

D. 45°

E. 45° or 135°



Just apply The Law of Sines.

If it is possible, then Law of Sines gives

$$\frac{\sin(30°)}{5} \overset{?}{=} \frac{\sin(N)}{5\sqrt{2}}$$

- if this equation has 1 solution, then just 1 triangle can be built.
- If this equation has 2 solutions then 2 triangles ⇒ 2 angles.
- If it has no solution ⇒ $\underline{0}$ triangle

$$\frac{\sin(30°)}{5} = \frac{\sin(N)}{5\sqrt{2}} \Rightarrow \frac{\cancel{5}}{\cancel{5}}\sin(N) = \frac{5\sqrt{2}}{5}\cdot\underbrace{\sin(30°)}_{=\frac{1}{2}}$$

$$\Rightarrow \sin(N) = \frac{\sqrt{2}}{2} \Rightarrow \boxed{N = 45° \text{ or } 135°}$$

Apply Formula

26. If $\sin\theta = \frac{1}{3}$ and θ lies in Quadrant II, find the exact value of $\sin\left(\theta + \frac{\pi}{6}\right)$.

$\to \sin\left(\theta + \frac{\pi}{6}\right) = \sin\theta \cos\frac{\pi}{6} + \cos\theta \sin\frac{\pi}{6}$

✓ ✓ find ✓

$= \frac{1}{3} \cdot \frac{\sqrt{3}}{2} + \frac{-2\sqrt{2}}{3} \cdot \frac{1}{2}$

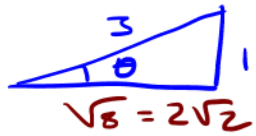
$= \boxed{\frac{\sqrt{3} - 2\sqrt{2}}{6}}$

A. $\frac{5}{6}$

B. $\frac{\sqrt{3}-1}{2}$

C. $\frac{\sqrt{3}+2\sqrt{2}}{6}$

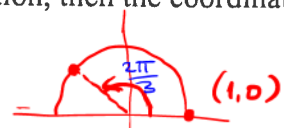
D. $\frac{\sqrt{3}-2\sqrt{2}}{6}$



$\Rightarrow \cos\theta = -\frac{2\sqrt{2}}{3}$

27. Suppose an ant is sitting on the perimeter of the unit circle at the point (1, 0). If the ant travels a distance of $2\pi/3$ in the counter-clockwise direction, then the coordinates of the point where the ant stops will be

+



A. $\left(\frac{-\sqrt{3}}{2}, \frac{1}{2}\right)$ B. $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ C. $\left(\frac{-1}{2}, \frac{\sqrt{3}}{2}\right)$ D. $\left(\frac{-\sqrt{3}}{2}, \frac{-1}{2}\right)$

$\Rightarrow \left(\cos\left(\frac{2\pi}{3}\right) = \frac{-1}{2},\ \sin\left(\frac{2\pi}{3}\right) = \frac{\sqrt{3}}{2}\right)$

Angle of Elevation

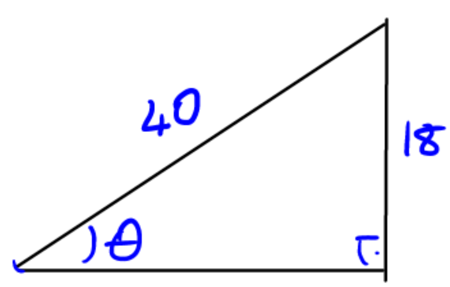
28. A skateboard ramp is 40 feet long and rises 18 feet. What is the angle of elevation of the ramp?

A. $\tan^{-1}\left(\frac{9}{20}\right)$

B. $\sin^{-1}\left(\frac{9}{20}\right)$

C. $\cos^{-1}\left(\frac{9}{20}\right)$

D. $\sin^{-1}\left(\frac{20}{9}\right)$



$\Rightarrow \sin\theta = \frac{\cancel{18}}{\cancel{40}}$

$\sin\theta = \frac{9}{20}$

$\Rightarrow \boxed{\theta = \sin^{-1}\left(\frac{9}{20}\right)}$

29. $sin\left(\frac{\pi}{3}\right) - cos\left(\frac{\pi}{6}\right) =$ $\frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} = 0$

A. 0 B. $\frac{\sqrt{3}-1}{2}$ C. $\frac{1-\sqrt{3}}{2}$ D. 1

30. ABC is a triangle with $cos(\text{B}) = \frac{\sqrt{3}}{2}$. What is/are the possible value(s) of B? Remember, ABC is a triangle!

A. $\frac{\pi}{6}$

B. $\left\{\frac{\pi}{6}, \frac{11\pi}{6}\right\}$

C. $\left\{\frac{\pi}{3}, \frac{2\pi}{3}\right\}$

D. $\left\{\frac{\pi}{6}, \frac{5\pi}{6}\right\}$

E. $\frac{\pi}{3}$

$\cos(\hat{B}) = \frac{\sqrt{3}}{2} \Rightarrow \hat{B} = 30^\circ$ or $\cancel{330^\circ}$

Another example: Think Δ ABC with $\sin(B) = \frac{\sqrt{2}}{2}$. What are possible values of $\hat{B}$?

$\Rightarrow \sin(\hat{B}) = \frac{\sqrt{2}}{2} \Rightarrow B = 45^\circ$ or 135° ✓ ✓

31. Solve $sin(5x) = 1$ on the interval $\left[0, \frac{\pi}{2}\right]$

B

period $= \frac{2\pi}{5}$

A. $x = \frac{\pi}{10}$

B. $x = \frac{2\pi}{5}, \quad x = \frac{10\pi}{3}$

C. $x = \frac{\pi}{10}, \quad x = \frac{\pi}{2}$

D. $x = \frac{\pi}{2}$

E. $x = \frac{\pi}{10}, \quad x = \frac{3\pi}{10}$

$\sin(5x) = 1$ period $= \frac{2\pi}{5}$

$\frac{\cancel{5}x}{\cancel{5}} = \frac{\frac{\pi}{2}}{5} \Rightarrow x_1 = \frac{\pi}{10}$ in one period ✓

Check next solution

$x_2 = \frac{\pi}{10} + \frac{2\pi \cdot 2}{5 \cdot 2} = \frac{5\pi}{10} = \frac{\pi}{2}$ ✓

Both included in $[0, \frac{\pi}{2}]$.

32. Solve $sin(2x) = -cos(x)$ on the interval $[0, 2\pi]$.

A. $\left\{x = \frac{\pi}{2},\ x = \frac{3\pi}{2}\right\}$

B. $\left\{x = \frac{7\pi}{6},\ x = \frac{11\pi}{6}\right\}$

C. $\left\{x = \frac{\pi}{6},\ x = \frac{5\pi}{6},\ x = \frac{\pi}{2},\ x = \frac{3\pi}{2}\right\}$

D. $\left\{x = \frac{7\pi}{6},\ x = \frac{11\pi}{6},\ x = \frac{\pi}{2},\ x = \frac{3\pi}{2}\right\}$

E. No solution.

$$\sin(2x) = -\cos x$$
$$2\sin x \cdot \cos x = -\cos x$$
$$2\sin x \cdot \underline{\cos x} + \underline{\cos x} = 0$$
$$\cos x(2\sin x + 1) = 0$$

$\cos x = 0$ or $2\sin x + 1 = 0$

$\boxed{x = \frac{\pi}{2},\ \frac{3\pi}{2}}$

$\hookrightarrow \sin x = -\frac{1}{2}$

$\boxed{x = \frac{7\pi}{6},\ \frac{11\pi}{6}}$

Law of Cosines

33. ABC is a triangle with AB = 4, BC = 7, and AC = 9. Find *cos* (A).

Note: You are asked to find cos(A) not the measure of angle A.

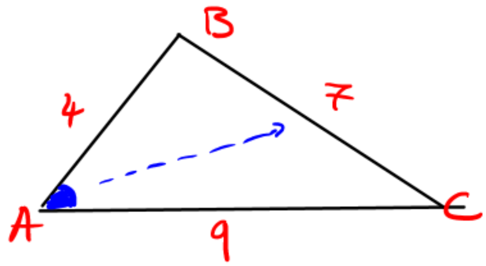
A. 19/12

B. 2/3

C. 9/4

D. 7/4

E. 4/3

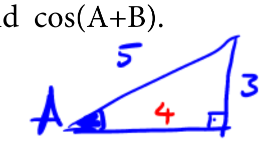


$$7^2 = 4^2 + 9^2 - 2 \cdot 4 \cdot 9 \cdot \cos A$$
$$49 = 16 + 81 - 72 \cdot \cos A$$
$$-48 = -72 \cos A$$
$$\Rightarrow \boxed{\cos A = \frac{48}{72} = \frac{2}{3}}$$

$\Rightarrow$ Evaluate the following expression: $\tan^{-1}(1) + \sin^{-1}(1/2)$

$$\frac{\pi}{4} + \frac{\pi}{6} = \frac{\pi \cdot 3}{4 \cdot 3} + \frac{\pi \cdot 2}{6 \cdot 2} = \boxed{\frac{5\pi}{12}}$$

$\Rightarrow$ If A and B are two acute angles such that sin(A)=3/5 and tan(B)=12/5, find cos(A+B).



$$\cos(A+B) = \cos A \cdot \cos B - \sin A \sin B$$
$$= \frac{4}{5} \cdot \frac{5}{13} - \frac{3}{5} \cdot \frac{12}{13} = \boxed{\frac{-16}{65}}$$