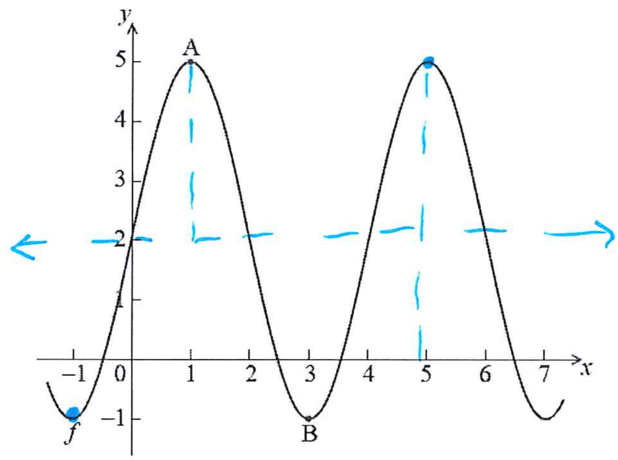
# SL Test 3.1 Review Day 1

Mock Tests/
Exam Style
Questions

**Foundational:**

ONE:

The diagram below shows part of the graph of a function $f$.




$q \cdot 4 = 2\pi$
$q = \frac{\pi}{2}$

The graph has a maximum at $A(1, 5)$ and a minimum at $B(3, -1)$.

The function $f$ can be written in the form $f(x) = p\sin(qx) + r$. Find the value of

(a) $p$; $= 3$ *[2 marks]*

(b) $q$; $\pi/2$ *[2 marks]*

(c) $r$. $2$ *[2 marks]*

TWO:

$\rightarrow 2\cos^2 A - 1 \rightarrow 2(\tfrac{1}{3})^2 - 1$

$\tfrac{2}{9} - 1$

(a) Given that $\cos A = \frac{1}{3}$ and $0 \le A \le \frac{\pi}{2}$, find $\cos 2A$. $-7/9$

(b) Given that $\sin B = \frac{2}{3}$ and $\frac{\pi}{2} \le B \le \pi$, find $\cos B$. ~~sin~~ 3, 2, B, $\sqrt{5}$ $\boxed{\cos B = -\frac{\sqrt{5}}{3}}$

THREE: Solve the equation $2\cos^2 x - \sin 2x = 0$ for $0 \le x \le \pi$, giving your answers in terms of $\pi$.

$2\cos^2 x - 2\sin x\cos x = 0$

$2\cos x(\cos x - \sin x) = 0$

$\cos x = 0$ $\qquad$ $\cos x = \sin x$

$x = \pi/2$ $\qquad$ $x = \frac{\pi}{4}$

**Moderate:**

FOUR:

Let $f(x)=\frac{3x}{2}+1$, $g(x)=4\cos\left(\frac{x}{3}\right)-1$. Let $h(x)=(g\circ f)(x)$.

(a) Find an expression for $h(x)$. $4\cos\left(\frac{1}{3}\left(\frac{3x}{2}+1\right)\right)-1=4\cos\left(\frac{x}{2}+\frac{1}{3}\right)-1$

$=4\cos\left(\frac{1}{2}\left(x+\frac{2}{3}\right)\right)-1$

(b) Write down the period of $h$. $bp=2\pi$, $\frac{1}{2}p=2\pi$, $\boxed{p=4}$

(c) Write down the range of $h$.

$\boxed{-5\leq y\leq 3}$

FIVE:

Show that $\frac{1-\cos 2x}{1+\cos 2x}$ simplifies to $\tan^2 x$.

$$\frac{1-(1-2\sin^2 x)}{1+2\cos^2 x-1}=\frac{2\sin^2 x}{2\cos^2 x}=\tan^2 x$$

SIX: Prove the identity below. In your proof, you can work with each side of the equation, but nothing should cross the equals sign.

**48.** $2\sin^4 x+2\sin^2 x\cos^2 x=1-\cos 2x$

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