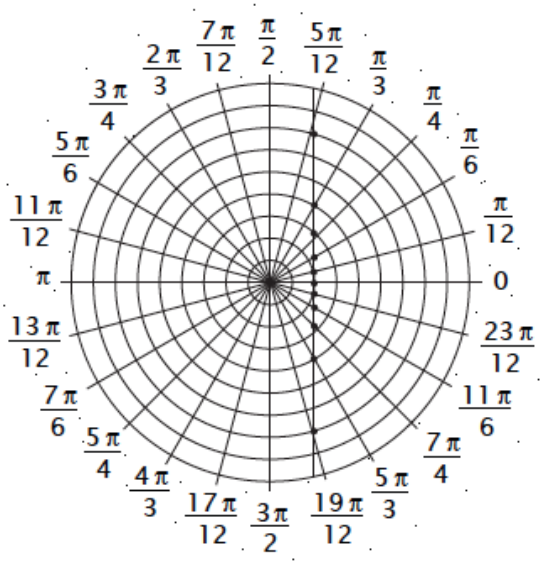
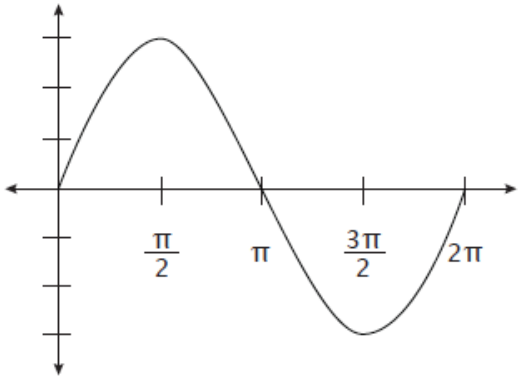
PreCalculus Placement Test
Answer Key

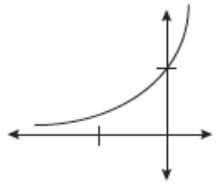
1.



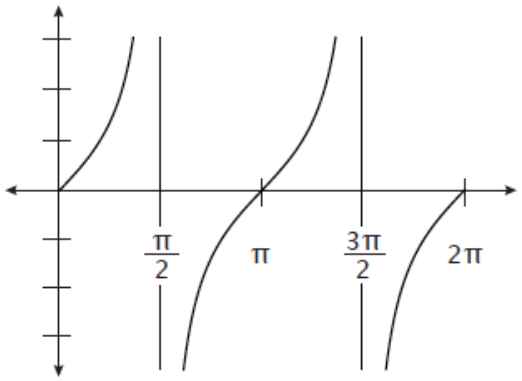
2.



3.



4.



5. $e^{2X} - e^X = 2$

$Y^2 - Y = 2$ (substituting Y for e^X)

$Y^2 - Y - 2 = 0$

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

$Y+1=0$	$Y-2=0$
$Y=-1$	$Y=2$
$e^X=-1$	$e^X=2$
$\ln e^X = \ln(-1)$	$\ln e^X = \ln 2$
not a real solution	$X=\ln 2$
	$X \approx .6931$

6. $\frac{\sqrt{X+3}}{2} < 1$

$\sqrt{X+3} < 2$

$\left(\sqrt{X+3}\right)^2 < 2^2$

$X+3 < 4$

$X < 1$

7. No real solutions because absolute value is always positive.

8. $e^{2X} = 5$

$\ln e^{2X} = \ln 5$

$2X \approx 1.6094$

$X \approx .8047$

9. $\tan\theta\csc\theta = \sec\theta$

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

$\frac{1}{\cos\theta} = \frac{1}{\cos\theta}$

10. $\csc^2\theta\left[\sin^2(90°-\theta)\right] + 1 = \csc^2\theta$

$\frac{1}{\sin^2\theta}\left[\cos^2\theta\right] + 1 = \frac{1}{\sin^2\theta}$

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

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

$\frac{1}{\sin^2\theta} = \frac{1}{\sin^2\theta}$

11. $\lim_{X\to\infty} \frac{1}{X} = 0$

As the numerator grows larger, the fraction grows smaller, but will never reach or pass 0.

12. $\lim_{X\to -5} \frac{X^2+3X-10}{X+5} =$

$\lim_{X\to -5} \frac{(X+5)(X-2)}{X+5} =$

$\lim_{X\to -5} X-2 =$

$\lim_{X\to -5} (-5)-2 = -7$

13. $\sum_{x=1}^{4}\{x^2-1\} = (1^2-1)+(2^2-1)+(3^2-1)+(4^2-1)$
$= (1-1)+(4-1)+(9-1)+(16-1)$
$= 0+3+8+15$
$= 26$

14. $\sin 135^\circ + \cos 60^\circ = -\sin 45^\circ + \cos 60^\circ$
$= \frac{\sqrt{2}}{2} + \frac{1}{2}$
$= \frac{1+\sqrt{2}}{2}$

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

16. The domain will be all x where $x+3$ is greater than or equal to 0:

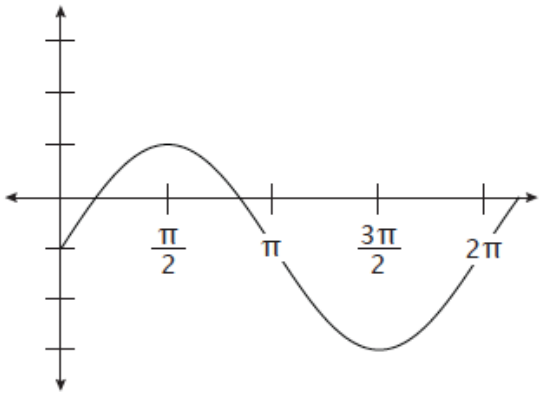
$x+3 \geq 0$
$x \geq -3$

domain: $[-3, \infty)$, or all numbers ≥ -3
range: $[0, +\infty)$

17. $\left(\frac{7\pi}{4}\right)\left(\frac{180^\circ}{\pi}\right) = \frac{(7)(180^\circ)}{4} = \frac{1{,}260^\circ}{4} = 315^\circ$

18. 70°; quadrant III

19.



20. $a_1 = -4$

$a_2 = a_1 r = (-4)\left(\frac{1}{2}\right) = -2$

$a_3 = a_2 r = (-2)\left(\frac{1}{2}\right) = -1$

$a_4 = a_3 r = (-1)\left(\frac{1}{2}\right) = -\frac{1}{2}$

$-4, -2, -1, -\frac{1}{2}$

21. $c^2 = a^2 + b^2 - 2ab\cos C$
$c^2 = (14)^2 + (12)^2 - 2(14)(12)\cos 56^\circ$
$c^2 \approx 196 + 144 - 336(.5592)$
$c^2 \approx 340 - 187.89$
$c^2 \approx 152.11$
$c \approx \sqrt{152.11}$
$c \approx 12.33$

$\frac{a}{\sin A} = \frac{c}{\sin C}$
$\frac{(14)}{\sin A} = \frac{(12.33)}{\sin(56^\circ)}$
$(12.33)(\sin A) = (14)(\sin 56^\circ)$
$\sin A = \frac{(14)(\sin 56^\circ)}{12.33}$
$\sin A \approx \frac{(14)(.8290)}{12.33}$
$\sin A \approx \frac{11.606}{12.33}$
$\sin A \approx .9413$
$A \approx \arcsin .9413$
$A \approx 70.3^\circ$

$B = 180^\circ - (70.3^\circ + 56^\circ)$
$B = 180^\circ - 126.3^\circ$
$B = 53.7^\circ$

22. $Q(t) = 10e^{-kt}$
$Q(365) = 10e^{-(.0069)(365)}$
$Q(365) = 10e^{-2.5185}$
$Q(365) \approx 10(.0806)$
$Q(365) \approx .806$ g