

**Pre-Calculus – March Regional**

1. D
2. A
3. A
4. C
5. B
6. C
7. E
8. B
9. D
10. A
11. A
12. A
13. C
14. B
15. B
16. C
17. D
18. A
19. C
20. E
21. B
22. C
23. C
24. A
25. B
26. C
27. A
28. D
29. C
30. D

# Pre Calculus - March regional

d 1. displacement to  $y = -3$ , amp = 3  $\therefore [-6, 0]$

a 2.  $\odot (0, -1.5)$

a 3.  $\ln 5 = \ln a (1.08)^t = \ln a + t \ln(1.08)$   $\ln 5 - \ln a = t \ln(1.08)$   $t = \frac{\ln 5 - \ln a}{\ln 1.08}$

c 4. product of roots is -51  $\therefore \frac{-51}{-4i} \cdot \frac{1+4i}{1+4i} = \frac{-51-204i}{17} = -3-12i$

b 5.  $\sin x (\tan x - 1) + \tan x - 1 = 0$   $\tan x = 1$   $\sin x = -1$   $\frac{\pi}{4} + \frac{5\pi}{4} + \frac{3\pi}{2} = 3\pi$   
 $(\tan x - 1)(\sin x + 1) = 0$   $\frac{\pi}{4}, \frac{5\pi}{4}$   $\frac{3\pi}{2}$

c 6  $\nearrow$

e 7.  $720 - 140 = 580^\circ$

b 8.  $(x+8)(x+18) = 1440$   $x^2 + 26x + 144 = 1440$   $x^2 + 26x - 1296 = 0$   $\frac{-26 \pm \sqrt{26^2 - 4(1)(-1296)}}{2} = \frac{-26 \pm \sqrt{5860}}{2} = 25.28$

d 9. shrinks the domain by a factor of  $\frac{1}{5}$   $\sin^{-1}(x)$   $-\frac{1}{5} \leq x \leq \frac{1}{5}$   
 $\sin^{-1}(5x)$   $-\frac{1}{5} \leq x \leq \frac{1}{5}$

a 10.  $\frac{1 \cdot 4 \cdot 8 \cdot 7 \cdot 6}{1} = 1344$

a 11.  $AC \perp CB$   $m_{AC} = \frac{k-2}{-1}$   $m_{CB} = \frac{k+3}{-6}$   $\frac{k-2}{-1} = \frac{6}{k+3}$   $k^2 + k - 6 = -6$   $k^2 + k = 0$   $k = -1$   $0 \neq (-1) = -1$

a 12.  $4a + 35 = 43$   $-4 - b = 10$   $-2a + 5b = m$   
 $a = 2$   $b = -14$   $-4 + 5(-14) = -74$

c 13.  $\cos 30^\circ \cos x + \sin 30^\circ \sin x + \cos 30^\circ \cos x - \sin 30^\circ \sin x = 2(\frac{\sqrt{3}}{2}) \cos x = \sqrt{3} \cos x$

b 14.  $\cos 72^\circ = \frac{11}{x}$   $x = \frac{11}{\cos 72^\circ} = 35.59675$  perimeter 93.193

b 15.  $2x = -2x + 4$   $C(1, 2)$   $V(4, 2)$   $\frac{b}{a} = 2$   $\frac{b}{9} = 2$   $b = 18$   
 $4x = 4$   $x = 1$   $a = 3$   $b^2 = 36$

c 16.  $\tan \theta = m$   $(x, z^3)$   $(0, 0)$   $m = \frac{z^3}{x} = x^2$   $\tan \theta = x^2$   $x = \sqrt{\tan \theta}$   $y = z^3 = \sqrt{\tan^3 \theta}$

d 17.  $e^x = x$   $y = \tan(e^x)$

a 18.  $\vec{a} = \frac{6(2i + 2j - k)}{3} = 4i + 4j - 2k$

c 19.  $30x + 14 - (35x + 2x) = 0$   $\ln 2 = .693$   $\therefore 6$   $\odot$

e 20.  $-7x + 14 = 0$   $x = 2$

b 21.  $\frac{a}{\sin 35^\circ} = \frac{c}{\sin 64^\circ}$   $a = \frac{c \sin 35^\circ}{\sin 64^\circ}$

c 22.  $\sqrt{2}$

c 23.  $80 + 80(.65) + 80(.65)^2 + \dots$   $\frac{80}{1-.65} = 228.57$

a 24.  $\frac{x}{10} - \frac{x}{20} = 1$   $2x - x = 20$   $x = 20$

b 25.  $A = 729$   $9^3 = 27^2$   $\sin 729 = .15$

c 26.  $(-1-h)^2 + (1-k)^2 = 2^2$   $(3-h)^2 + (5-k)^2 = 2^2$   $h^2 + k^2 + 2h - 2k + 2 = h^2 + k^2 - 6h - 10k + 34$   $8h + 8k - 32 = 0$   $-4k + 8 = 0$   $k = 2$   $h = 2$

a 27.  $x = \frac{4+5}{1+k}$   $\frac{xy + zk}{y-k} = \frac{4+5}{1+k}$   $y = \frac{5-kx}{x-1}$   $\frac{x+5}{x+k} = \frac{5-kx}{x-1}$   $x^2 + 5x - x - 5 = 5x + 5k - kx^2 - k^2x$   $x^2 - x - 5 = -k(x^2 + kx - 5)$   $k = -1$

d 28.  $.85 = \frac{k}{100,000}$   $k = 35,000$   $\frac{35,000}{14} = 2500$

c 29.  $\frac{\theta}{r} = \text{angular velocity}$   $r(\frac{\theta}{r}) = \text{linear velocity}$   $v(40)$   $(x+1)(40)$   $\therefore 40$

d 30.  $1 + \frac{1}{a+b} = \frac{a+b}{a+b}$