

Math 160 - Test #3 Review Exercise Answers

1.

- a) All solutions: $\pi + 2\pi k, \frac{\pi}{6} + 2\pi k, \frac{11\pi}{6} + 2\pi k$; Solutions in $[0, 2\pi)$: $\frac{\pi}{6}, \pi, \frac{11\pi}{6}$
- b) All solutions: $\frac{\pi}{2} + \pi k$; Solutions in $[0, 2\pi)$: $\frac{\pi}{2}, \frac{3\pi}{2}$
- c) All solutions: $0.34 + 2\pi k, 2.80 + 2\pi k, \frac{3\pi}{2} + 2\pi k$; Solutions in $[0, 2\pi)$: $0.34, 2.80, \frac{3\pi}{2}$
- d) All solutions: $\frac{2\pi}{3} + 2\pi k$; Solutions in $[0, 2\pi)$: $\frac{2\pi}{3}$
- e) All solutions: $\frac{\pi}{3} + 2\pi k, \pi + 2\pi k, \frac{5\pi}{3} + 2\pi k$ (Note: this can be written as $\frac{\pi}{3} + \frac{2\pi}{3}k$); Solutions in $[0, 2\pi)$: $\frac{\pi}{3}, \pi, \frac{5\pi}{3}$
- f) All solutions: $\pi k, \frac{\pi}{16} + \frac{\pi}{2}k, \frac{3\pi}{16} + \frac{\pi}{2}k$; Solutions in $[0, 2\pi)$: $0, \frac{\pi}{16}, \frac{3\pi}{16}, \frac{9\pi}{16}, \frac{11\pi}{16}, \pi, \frac{17\pi}{16}, \frac{19\pi}{16}, \frac{25\pi}{16}, \frac{27\pi}{16}$
- g) All solutions: $\frac{5\pi}{2} + 3\pi k$; Solutions in $[0, 2\pi)$: No solutions in $[0, 2\pi)$

2. Component form: $\langle 1, -7 \rangle$ \vec{i} and \vec{j} form: $\vec{i} - 7\vec{j}$

3.

- a) $\sqrt{26}$
- b) $\langle 3, 11 \rangle$ (or $3\vec{i} + 11\vec{j}$)
- c) 236.31°
- d) $\langle -\frac{2}{\sqrt{13}}, -\frac{3}{\sqrt{13}} \rangle$
- e) -13
- f) 135°
- g) $-\frac{13}{\sqrt{26}}$ (or $-\frac{\sqrt{26}}{2}$)
- h) $\langle \frac{1}{2}, -\frac{5}{2} \rangle$
- i) $\vec{u}_1 = \langle \frac{1}{2}, -\frac{5}{2} \rangle, \vec{u}_2 = \langle -\frac{5}{2}, -\frac{1}{2} \rangle$

4. $\vec{u}_1 = \langle \frac{16}{5}, -\frac{8}{5} \rangle, \vec{u}_2 = \langle \frac{9}{5}, \frac{18}{5} \rangle$

5.

- a) $\langle -360.26, 28.19 \rangle$
- b) 361.36 mi/h
- c) $N 85.53^\circ W$

6. $N 23.58^\circ E$

7. 737.28 lbs and 652.17 lbs

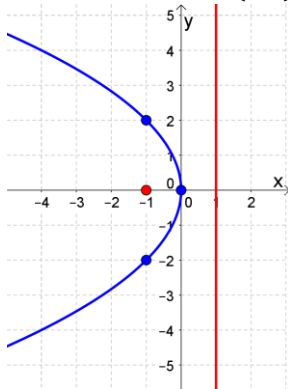
8. No

9. Magnitude of force required to keep skateboard from rolling down hill: 6.95 lbs
 Magnitude of force experienced by slope: 39.39 lbs

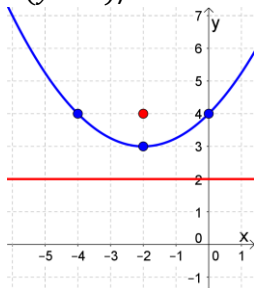
10. 11.54°

11.

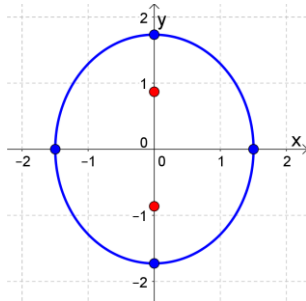
- a) Parabola. Vertex: $(0,0)$; Focus: $(-1,0)$; Directrix: $x = 1$; Focal diameter: 4 (Note: $y^2 = -4x$)



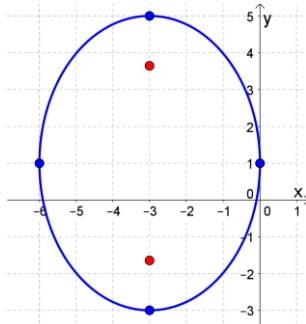
- b) Parabola. Vertex: $(-2,3)$; Focus: $(-2,4)$; Directrix: $y = 2$; Focal diameter: 4 (Note: $(x + 2)^2 = 4(y - 3)$)



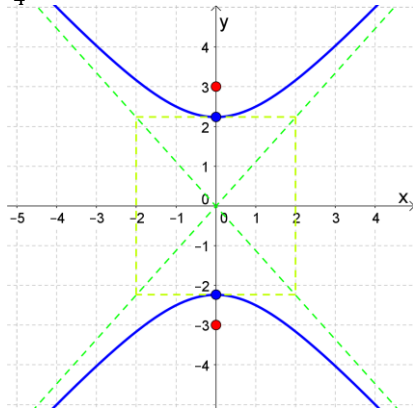
- c) Ellipse. Center: $(0,0)$; Foci: $(0, \pm \frac{\sqrt{3}}{2})$; Vertices: $(0, \pm \sqrt{3})$; Major axis length: $2\sqrt{3}$; Minor axis length: 3; Eccentricity: $\frac{1}{2}$ (Note: $\frac{x^2}{(\frac{9}{4})} + \frac{y^2}{3} = 1$)



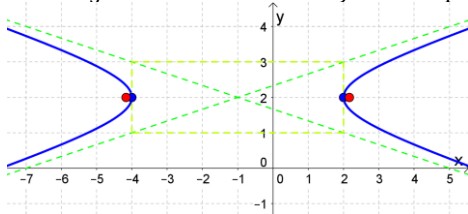
- d) Ellipse. Center: $(-3,1)$; Foci: $(-3, 1 \pm \sqrt{7})$; Vertices: $(-3,5)$ and $(-3,-3)$; Major axis length: 8; Minor axis length: 6; Eccentricity: $\frac{\sqrt{7}}{4}$ (Note: $\frac{(x+3)^2}{9} + \frac{(y-1)^2}{16} = 1$)



- e) Hyperbola. Center: $(0, 0)$; Foci: $(0, \pm 3)$; Vertices: $(0, \pm\sqrt{5})$; Asymptotes: $y = \pm \frac{\sqrt{5}}{2}x$ (Note: $\frac{y^2}{5} - \frac{x^2}{4} = 1$)



- f) Hyperbola. Center: $(-1, 2)$; Foci: $(-1 \pm \sqrt{10}, 2)$; Vertices: $(2, 2)$ and $(-4, 2)$; Asymptotes: $y - 2 = \pm \frac{1}{3}(x + 1)$ (Note: $\frac{(x+1)^2}{9} - \frac{(y-2)^2}{1} = 1$)



12. $(y - 1)^2 = 4(x + 3)$

13. $\frac{(x-2)^2}{5} + \frac{(y+2)^2}{9} = 1$

14. $\frac{y^2}{25} - \frac{9x^2}{100} = 1$

15. $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{C}{(x+1)^3} + \frac{Dx+E}{x^2+x+1} + \frac{Fx+G}{x^2+5} + \frac{Hx+I}{(x^2+5)^2} + \frac{J}{7x-3}$

16. $\frac{2}{3x-1} - \frac{1}{x-2} - \frac{2}{x+1}$

17. $\frac{3}{x} - \frac{1}{x^2} + \frac{5}{x+2} - \frac{2}{(x+2)^2}$

18. $\frac{6}{x-5} - \frac{2x-3}{x^2+2}$

19. $-\frac{2}{x+1} + \frac{5}{x^2+1} - \frac{2x}{(x^2+1)^2}$

20. $2x^2 + x - 3 + \frac{2}{x+2} - \frac{5}{(x+2)^2}$

21. $(-\frac{3}{2}, 6), (1, 1)$

22. $(-3, \sqrt{2}), (-3, -\sqrt{2})$