1.

(a) Eliminate the parameter $t$: $x = t^3 - 2$ and $2y = 1 - t^2$

i. $y = 1 - \sqrt[3]{(x+2)^2}$

ii. $y = 1 + \sqrt[3]{(x+2)^2}$

iii. $y = 1 + \sqrt{(x+2)^3}$

iv. $y = 1 - \sqrt[3]{(x+2)^2}$

2. Eliminate the parameter $t$: $x = 4\sin(t) + 1$ and $y = 3\cos(t) - 2$ A. $\dfrac{(x-1)^2}{16} + \dfrac{(y+1)^2}{9} = 1$ A. $\dfrac{(x-1)^2}{4} + \dfrac{(y+1)^2}{3} = 1$ A. $\dfrac{(x-1)^2}{3} + \dfrac{(y+1)^2}{4} = 1$ A. $\dfrac{x^2}{16} + \dfrac{y^2}{9} = 1$

3. Convert the polar coordinate $(6, -2\pi/3)$ to rectangular coordinates A. $(-3, -3\sqrt{3})$ A. $(3, 3\sqrt{3})$ A. $(3\sqrt{3}, -3\sqrt{3})$ A. $(-3, -3)$ A. $(3, 3\sqrt{3})$

4. Convert this equation to polar coordinates: $x^2 - y^2 = 16$ A. $r^2 = \dfrac{16}{\cos^2\theta - \sin^2\theta}$ A. $r^2 = \dfrac{4}{\cos^2\theta + \sin^2\theta}$ A. $r^2 = \dfrac{16}{\cos^2\theta + \sin^2\theta}$ A. $r^2 = \dfrac{4}{\cos\theta - \sin\theta}$

5. Convert this equation to rectangular coordinates: $r = 3\sec\theta$ A. $x = 3$ A. $x = 1$ A. $y = 3$ A. $y = 1$

6. Which of the following is the graph of $r = \cos(3\theta)$ A. A 3 leaf rose with $x$-intercepts $(0,0), (1,0)$ A. A 6 leaf rose with $x$-intercepts $(0,0), (\pm 1, 0)$ A. A 3 leaf rose with no $x$ intercept A. A 6 leaf rose with no $x$ intercept

7. A baseball pitcher throws a baseball with an initial speed of 138 feet per second at an angle of 20° to the horizontal. The ball leaves the pitcher's hand at a height of 4 feet above the ground. Write the equations of motion, $v_x$ and $v_y$ for velocity and $s_x, s_y$ for position. A. $v_x(t) = 129.7$, $v_y(t) = 47.2 - 32t$, $s_x(t) = 129.7t$, $s_y(t) = 47.2t - 16t^2 + 4$ A. $v_x(t) = 129.7$, $v_y(t) = 47.2 - 16t$, $s_x(t) = 129.7t$, $s_y(t) = 47.2t - 16t^2 + 4$ A. $v_x(t) = 129.7$, $v_y(t) = 47.2 + 32t$, $s_x(t) = 129.7t$, $s_y(t) = 47.2t - 16t^2$ A. $v_x(t) = 129.7$, $v_y(t) = 47.2 - 32t$, $s_x(t) = 129.7t$, $s_y(t) = 47.2t - 16t^2$

8. Let $u = \langle -3, 5\rangle$ and $\vec{v} = \langle 1, 4\rangle$ and $\vec{w} = \langle 6, -3\rangle$ find $\vec{u} + 2\vec{v} - \vec{w}$ A. $\langle -7, 16\rangle$
   A. $\langle -8, 16\rangle$
   A. $\langle -6, 14\rangle$
   A. $\langle -7, 14\rangle$

9. Given $\vec{u} = \langle 3\sqrt{3}, -5\rangle$, find $\|\vec{u}\|$ A. $2\sqrt{13}$ A. $3\sqrt{13}$ A. $2\sqrt{17}$ A. $3\sqrt{17}$

10. Given $\vec{u} = \langle -10, 9\rangle$, find a unit vector in the direction of $\vec{u}$ A. $\langle -\frac{10}{\sqrt{181}}, \frac{9}{\sqrt{181}}\rangle$ A. $\langle -\frac{10}{\sqrt{19}}, \frac{9}{\sqrt{19}}\rangle$ A. $\langle -\frac{10}{\sqrt{181}}, -\frac{9}{\sqrt{181}}\rangle$ A. $\langle -\frac{10}{\sqrt{19}}, -\frac{9}{\sqrt{19}}\rangle$

11. Which vector is perpendicular to $\langle \frac{2}{3}, -\frac{17}{2}\rangle$ A. $\langle -9, -\frac{6}{17}\rangle$ A. $\langle 9, \frac{18}{3}\rangle$ A. $\langle -9, -\frac{17}{18}\rangle$ A. $\langle -9, -17\rangle$

12. Which vector is parallel to $\langle \frac{2}{3}, -\frac{17}{2}\rangle$ A. $\langle 4, -51\rangle$ A. $\langle 2, -25\rangle$ A. $\langle -51, 4\rangle$ A. $\langle 25, -2\rangle$

13. What is the radian angle between $\langle 5, 1\rangle$ and $\langle 2, -3\rangle$ A. 1.180 A. 1.080 A. 1.480 A. 1.580

14. If vector $\vec{x}$ has magnitude 9 and makes an angle of 3.4 radians with the positive $x$ axis, find the components of $x$ and write as $a\hat{i} + b\hat{j}$. A. $-8.70\hat{i} - 2.30\hat{j}$ A. $8.70\hat{i} + 2.30\hat{j}$ A. $-2.30\hat{i} - 8.70\hat{j}$ A. $-9.20\hat{i} + 3.20\hat{j}$

15. Write the complex number $-3 + 9i$ in polar form. A. $9.49e^{1.89i}$ A. $9.59e^{1.79i}$ A. $9.29e^{1.81i}$ A. $9.49e^{1.33i}$

16. Divide $10 - 9i$ by $2 - 4i$, and express your answer in the form $a + bi$. A. $\frac{14}{5} + \frac{11}{10}i$ A. $-\frac{4}{5} + \frac{29}{10}i$ A. $-\frac{4}{5} - \frac{29}{10}i$ A. $\frac{14}{5} - \frac{11}{10}i$

17. Simplify the product $\sqrt{7}e^{-i\pi/3} \cdot 3e^{i\pi/5}$. A. $3\sqrt{7}e^{-2\pi i/15}$ A. $3\sqrt{7}e^{2\pi i/15}$ A. $3\sqrt{7}e^{-\pi i/15}$ A. $3\sqrt{7}e^{\pi i/15}$

18. Solve the equation $z^2 - 2z + 5 = 0$ for $z$ and express your answers in rectangular form. A. $1 \pm 2i$ A. $1 \pm 3i$ A. $1 \pm \sqrt{5}i$ A. $1 \pm 2i^2$

19. If $z = 2 + i$ is one root of a quadratic equation $x^2 + bx + c$ with real coefficients, what is $bc$? A. $-20$ A. $-10$ A. 4 A. 8

20. If $z^4 = 16e^{2\pi i/5}$, find all values of $z$ in polar form. A. $z = 2e^{\pi i/10}, 2e^{3\pi i/5}, 2e^{11\pi i/10}, 2e^{8\pi i/5}$ A. $z = 2, 2e^{\pi i/2}, 2e^{\pi i}, 2e^{3\pi i/2}$ A. $z = 2e^{\pi i/10}, 2e^{3\pi i/10}, 2e^{5\pi i/10}, 2e^{7\pi i/10}$ A. $z = 2e^{2\pi i/5}, 2e^{4\pi i/5}, 2e^{6\pi i/5}, 2e^{8\pi i/5}$

21. Factor $z^2+9$ into a product of two binomials. A. $(z+3i)(z-3i)$ A. $(z+3)(z-3)$ A. $(z+3i)(z+3i)$ A. $(z+3\sqrt{i})(z-3\sqrt{i})$

22. (Bonus): By multiplying two complex numbers, prove the addition identities for sin and cos.