1) $y = x^2 + 1$

2) $x(t) = t + 1$, $y(t) = 4t^3$

3) Yes, they intersect (twice). They do not collide

4) $(x-6)^2 + (y-5)^2 + (z-7)^2 = 5^2$

5) $\|\overrightarrow{PQ}\| = 6$, $\|\overrightarrow{PR}\| = 6$, $\|\overrightarrow{QR}\| = 2\sqrt{10}$

6) a) $\langle 10, 10, 400 \rangle \cdot (\underline{r} - \langle -10, 10, 3 \rangle) = 0$

b) $\underline{r}(t) = \langle 1, -1, 0 \rangle + t \langle 10, 10, 400 \rangle$

   Fire the laser in direction $\langle 10, 10, 400 \rangle$.

   $(861/801, -741/801, 2400/801)$

c) $x = 10t$, $y = 100 - 10t$, $z = 0$

7) 138.7 ft/s

8) a) Hits at $t = 9s$

b) 2250 m

9) scalar projection $-17/\sqrt{14}$

   vector projection $\langle -17/7, 51/14, -17/14 \rangle$

10) $\langle 6, 3, 2 \rangle$

11) a) Do not collide

b) Projectile arrives at intersection point first

c) Detonate the projectile between $t = 0.97$ and $t = 1.12$.

12) $\langle \sqrt{3}/2, -3\sqrt{3}/5, \tfrac{3}{}\sqrt{13}/10 \rangle$

13) (Answers vary — see p. 643 + 644)

14) }

15) $\langle -6/\sqrt{10}, 2/\sqrt{10} \rangle$ or $\langle 6/\sqrt{10}, -2/\sqrt{10} \rangle$

16) Projection: $\langle 1, 0 \rangle$ Component: -1

17) Yes, they are always 0...

18) no orthogonal pairs but $\underline{a}$ and $\underline{c}$ are parallel

19) a) direction of $\underline{a} \times \underline{b} = -\hat{j}$. direction of $\underline{b} \times \underline{a} = \hat{j}$.

b) 24

20) $x = -5 + t$, $y = 2 + t$, $z = 1 + 6t$

21) $60.7°$