1 | 1.

1.1 | a)

$$\begin{aligned}
t &= \frac{x(t)-4}{3} \\
t &= \frac{y(t)-7}{5} \\
\frac{x(t)-4}{3} &= \frac{y(t)-7}{5} \\
5(x(t)-4) &= 3(y(t)-7) \\
5x(t)-20 &= 3y(t)-21 \\
5x(t)+1 &= 3y(t) \\
\frac{5}{3}x(t)+\frac{1}{3} &= y(t) \\
y &= \frac{5}{3}x(t)+\frac{1}{3}
\end{aligned}$$

1.2 | b)

$(4, -7)$

1.3 | c)

3

1.4 | d)

5

1.5 | e)

$\sqrt{34}$

2 | 2.

$$\int_{t_0}^{t_1} \sqrt{\left(\frac{d\,x(t)}{dt}\right)^2 + \left(\frac{d\,y(t)}{dt}\right)^2}\,dt$$

3 | 3.

3.1 | a)

This problem is trivial, and is left as an exercise to Andrew.

3.2 | b)

$$
\begin{aligned}
x(\theta) &= r\cos\theta \\
y(\theta) &= r\sin\theta \\
L &= \int_0^{2\pi} \sqrt{(-\sin\theta)^2 + (\cos\theta)^2}\, d\theta \\
&= \int_0^{2\pi} \sqrt{r^2\sin(\theta)^2 + r^2\cos(\theta)^2}\, d\theta \\
&= \int_0^{2\pi} \sqrt{r^2}\, d\theta \\
&= \int_0^{2\pi} r\, d\theta \\
&= 2r\pi
\end{aligned}
$$