1) Use the arc length formula to find the length of the curve $y = 2 - 3x,\ -2 \le x \le 1$. Check your answer by using the distance formula since the curve is a line segment.

$\boxed{3\sqrt{10}}$

Find the length of the curve.

2) $y = 1 + 6x^{3/2},\ 0 \le x \le 1$ $\boxed{\frac{2}{243}\left(82\sqrt{82} - 1\right)}$

3) $y = \frac{x^5}{6} + \frac{1}{10x^3},\ 1 \le x \le 2$ $\boxed{\frac{1261}{240}}$

4) $y=\frac{x^2}{2}-\frac{\ln x}{4},\ \ 2\le x\le 4$ $\boxed{6+\frac{\ln 2}{4}}$

5) $y=\ln(\cos x),\ \ 0\le x\le \frac{\pi}{3}$ $\boxed{\ln\left(2+\sqrt{3}\right)}$

6) Find the arc length function for the curve $y=2x^{3/2}$ with starting point $P_0(1,2)$.

$$\boxed{\frac{2}{27}\left[\left(1+9x\right)^{3/2}-10\sqrt{10}\right]}$$

7) A hawk flying at 15 m/s at an altitude of 180 m accidentally drops its prey. The parabolic trajectory of the falling prey is described by the equation:

$$y = 180 - \frac{x^2}{45}$$

until it hits the ground, where y is its height above the ground and x is the horizontal distance traveled in meters. Calculate the distance traveled by the prey from the time it is dropped until the time it hits the ground. Express your answer correct to the nearest tenth of a meter.

$$\boxed{\approx 209.1 \text{ m}}$$

8) A steady wind blows a kite due west. The kite's height above ground from horizontal position $x = 0$ to $x = 80$ ft is given by the equation:

$$y = 150 - \frac{1}{40}(x - 50)^2$$

Find the distance traveled by the kite.

$$\boxed{\approx 122.8 \text{ ft}}$$

9) Find the length of the curve $y = \int_1^x \sqrt{t^3 - 1}\, dt$, $1 \le x \le 4$.

12.4