

## Answers to Week 6

### • Section 3.5

1. .

(a)  $f'(x) = 30x^2(x^3 - 4)^9$

(b)  $y' = -6 \cos^2(2x) \sin(2x)$

(c)  $f'(x) = \frac{(4x^2 - 1)^8(6)(2x + 3)^2 - (2x + 3)^3(32x)(4x^2 - 1)^7}{(4x^2 - 1)^{16}} = \frac{2(2x + 3)^2(52x^2 + 96x + 3)}{(4x^2 - 1)^9}$

(d)  $-8(1 + x^5 \cot x)^{-9}(5x^4 \cot x - x^5 \csc^2 x)$

2. Questions and Answers vary.

3. -6

### • Section 3.6

1.  $\frac{dy}{dx} = -\frac{2xy}{x^2} = -\frac{2x\left(\frac{1}{x^2}\right)}{x^2} = -\frac{2}{x^3}$

2. 1

3. Questions and Answers vary

4.  $m_1 = \frac{3}{4}, m_2 = -\frac{4}{3}$

5.  $m_1 = -\frac{x}{y}, m_2 = \frac{y}{x}$

### • Section 3.7

1.  $vel = -2\sqrt{3}\mathbf{i} - 2\mathbf{j}$ , speed = 4

2.  $\mathbf{T} = \left(\frac{1}{\sqrt{1+4\pi^2}}\right)\mathbf{i} + \left(\frac{2\pi}{\sqrt{1+4\pi^2}}\right)\mathbf{j}$

3.  $\mathbf{r}(0) = 4\mathbf{i}$ ,  $\mathbf{r}'(0) = -3\mathbf{j}$ . Object starts at the point (4, 0) and moves clockwise around the ellipse  $\frac{x^2}{16} + \frac{y^2}{9} = 1$

4. 79°